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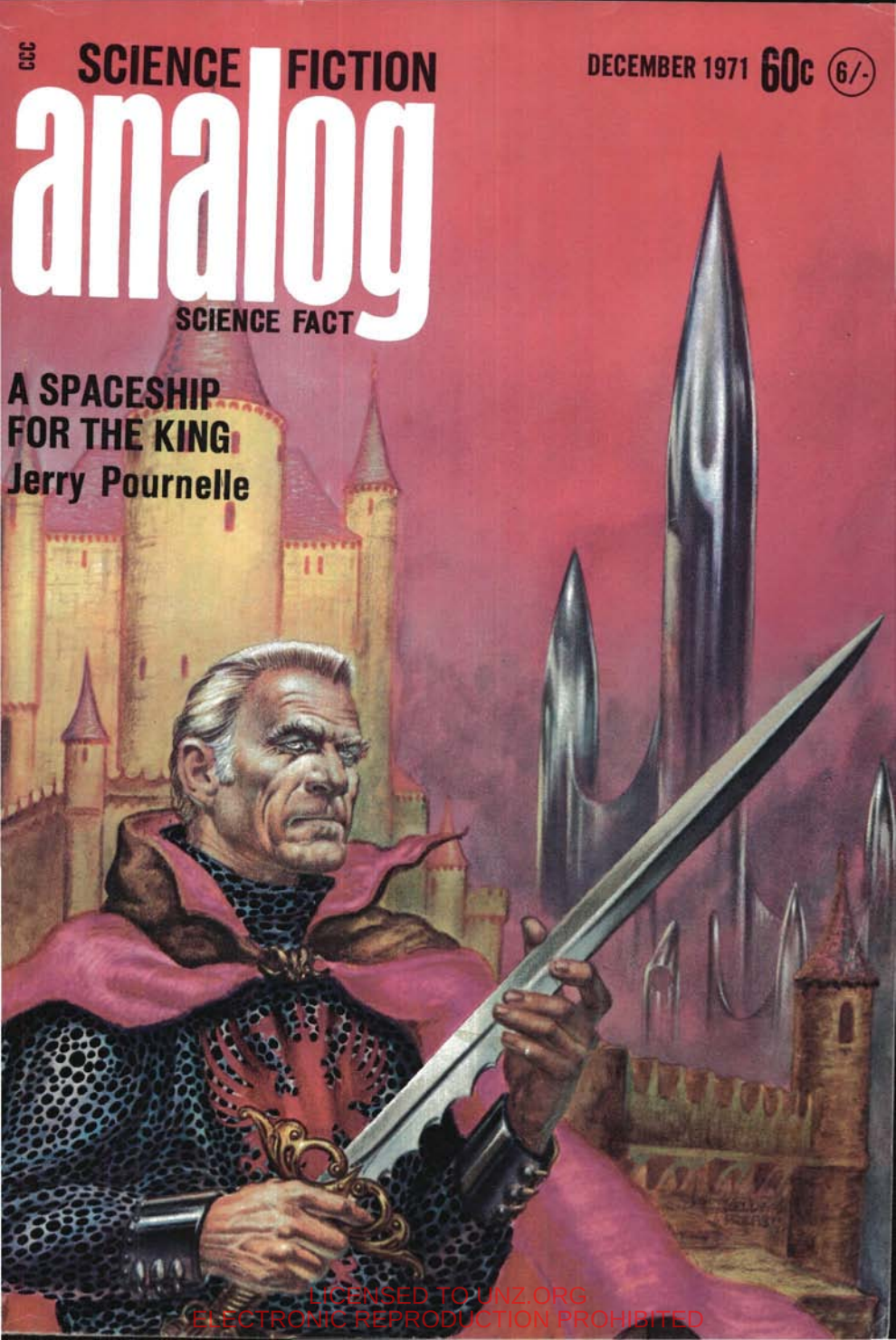
A SPACESHIP FOR THE KING

Jerry Pournelle



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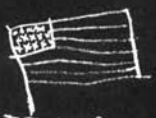

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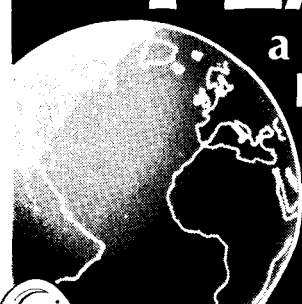

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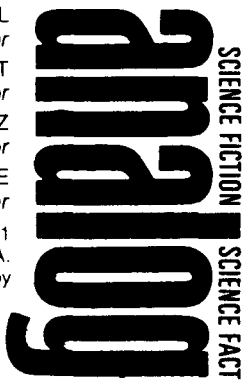

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"Those Impossible Quasars"

an editorial by
John W. Campbell

The technique of radio astronomy interferometry is well established now, and the super-long base-line interferometry is extending its possibilities to problems that were "clearly impossible" a few years ago.

The problem with radio astronomy is that the radiation being studied is of immensely long wavelength—as compared to light waves, that is. On a mathematical-theoretical basis a radio telescope can pinpoint a target just as precisely, determine its exact angular position just as accurately, as can an optical telescope. The practical problem has been that to do that, the radio-telescope mirror must be as many wavelengths of radio frequency wide as the optical telescope is in wavelengths of light.

The 200-inch Palomar mirror, most carefully ground and figured while lying on its back, would have been many wavelengths of light off of focus when tilted up on edge—if it hadn't been braced and cross-balanced with a complex series of levered counterweights applying pressure to holes in the back of the mirror to compensate for the dragging weight of the mirror itself. The compensation is a good job—but a weightless mirror in space would not have those residuals, the bumps and hollows produced by the inescapable local stresses.

If the problem's bad in an optical telescope only 200 inches in diameter, which can be made of a hard, extremely rigid and highly elastic ma-

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terial such as glass, the effects of scale factors really get into the act on a 200-*foot* radio-telescope mirror. For something that size, you *can't* use the immense mass of hard, rigid material that a glass mirror would imply; instead you have to settle for a latticework of steel or aluminum, covered with either plates, or wire mesh, to provide the parabaloid figure of the telescope mirror. And even the most gigantic radio telescope existent today doesn't give as many wavelength diameters as the fairly common amateur homemade back-yard optical telescope.

However, what can't be done by the straight-on bulldozer approach can often be done even better than the theoretical ideal by using an entirely different "side door approach" to a problem.

A radio telescope can locate a radio source to within a fraction of a degree in the sky—but an optical telescope such as the Palomar big eye, can't cover, in any one photograph, much more area of the sky than that radio telescope's sharpest localization!

This led to tremendous problems when powerful radio sources were found by radio astronomy, but the optical object corresponding couldn't be determined. Where the radio astronomer saw one bright blur most of a degree across, the optical astronomer found thousands of stars, hundreds of galaxies, and innumerable wisps of nebular material. Sometimes a radio source of enormous brilliance finally turned out to be an optical object so dim only the really large telescopes could see it at all. Optically extremely brilliant stars turn out to be radio-quiet and dim.

The quasars were among the most difficult; optically they were very dim, bluish, slightly fuzzy "quasi-stellar-objects" but they were very conspicuous at radio frequencies. Identifying the slightly odd optical objects with the spectacularly noisy radio sources took a lot of study and trials; optical telescope "recordings"—photographs—of the area the radio telescopes reported showed thousands of possible objects.

The Aussies, who've been at the forefront of radio astronomy, were among the first to show one technique by which radio objects could be located with real precision. The Moon, as seen from Earth, at various times of the month and year, can occult anything in a band about 10° wide; if a solid mass of matter 2,000 miles through moves between your radio telescope and a distant radio source, it chops off the radiation quite effectively. If you know precisely where your telescope is, and precisely where the Moon is when the occultation occurs, you have a highly precise line of direction to the radio source.

It can be somewhat frustrating waiting a year or two—or three—while the Moon's shifting orbit finally gets the alignment you need—but that gives you a precision an-

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gular measurement with even a relatively small radio telescope. Of course, if the radio object you want to know about happens to lie either too far north or too far south, the Moon never will occult it, and you're out of luck.

The limiting resolution of telescopes such as the 100-inch Mount Wilson, or the 200-inch Palomar jobs is *not* the precision of the mirror shape, or the wavelength diameter of the instrument, but the turbulence of Earth's atmosphere. If it weren't for that, the 100-inch or the 200-inch 'scope could take photographs of stars showing the disks of several of the nearer stars, and a number of the huge red giants in this local volume of space. A number of "spectroscopic binaries" would become "telescopic binaries"; the two images could be separated.

Years ago, Michelson, of the better known Michelson-Morley experiment that led to Einstein's studies and relativity, set up and performed an experiment at the Mount Wilson Observatory, using a pair of mirrors some 30 feet apart

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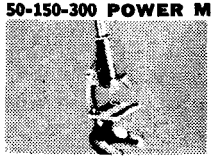

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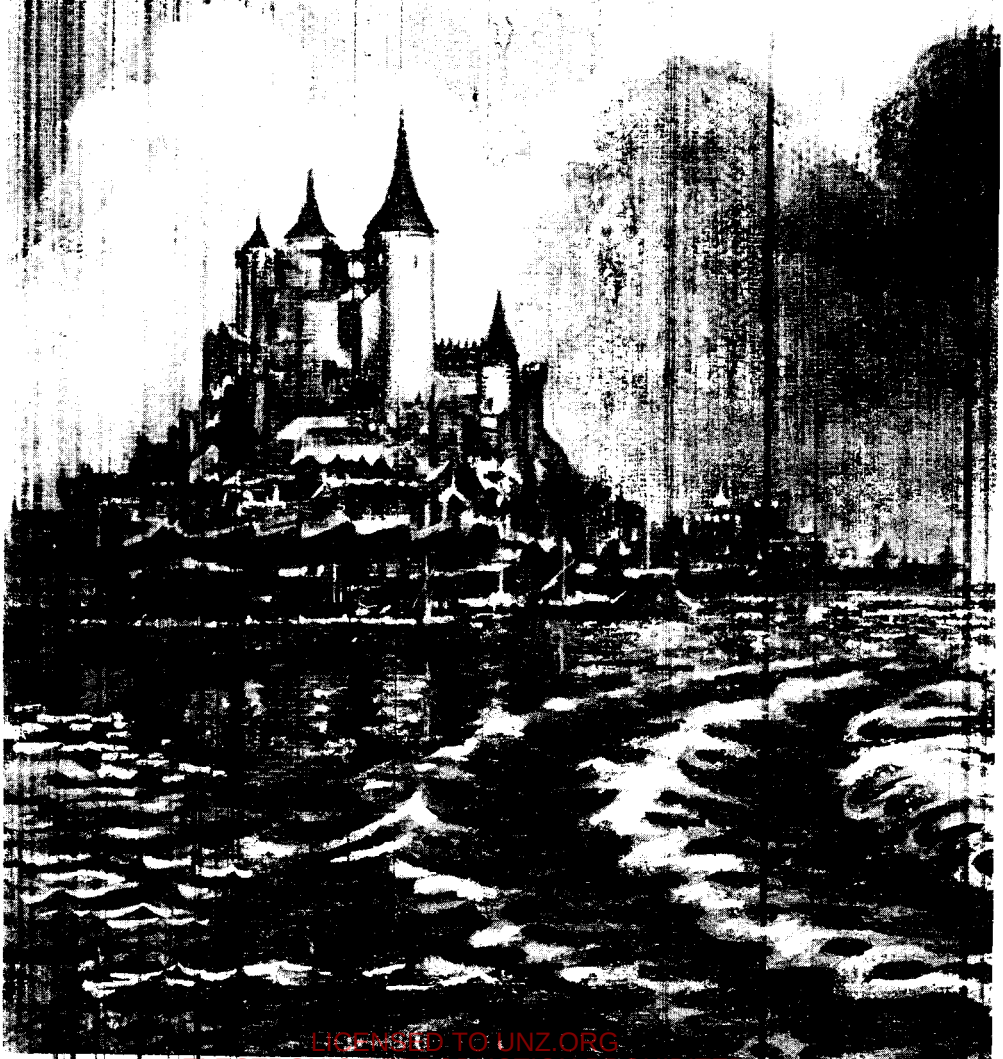
A Spaceship For The King

Part One of Three Parts. Primitive is a relative term. The Empire was oppressive, not evil, and its weapons could kill men and defeat nations but it takes a lot more to defeat men!

by JERRY POURNELLE



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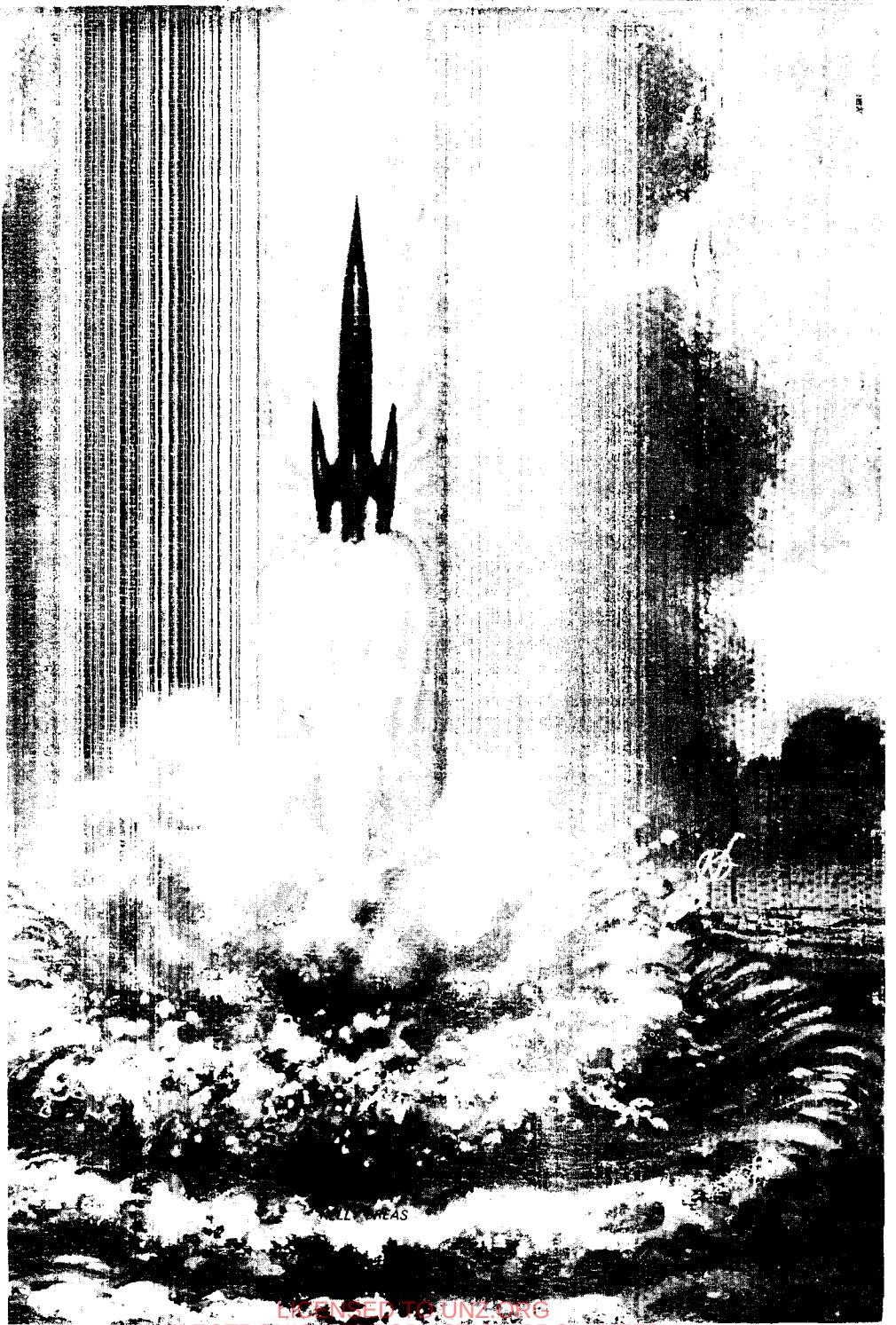

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I

The crowd was getting noisy in the Blue Bottle, although it was early in the evening. Tavern girls squealed as customers pinched them, gaily clad waiters brought round after round of drinks, and throughout much of the room everyone was shouting merrily. The reason was not hard to find, for in one corner of the crowded room, three officers of the Imperial Navy held court, buying drinks for anyone on Prince Samual's World who would sit with them and laugh at their jokes. Some of the regulars held back, their distaste at the enforced association more evident with every round, but for each of them there were four others from Haven City more than willing to share the Emperor's humor and liquor. Before the night ended, the officers would doubtless gain some recruits for the Royal and Imperial Marines, young lads suddenly sobered to find themselves in an iron service out among the stars, never to see their homes and discovering that Imperial officers were not such jolly good fellows when you were under their command.

For the moment the whiskey and brandy, and Grua distilled from a cross between a berry and a peach grown only on Prince Samual's northern continent flowed freely, the jokes were new to the locals even if they had been told a century before in the barracks at New Annapolis, and for a few moments His Imperial Majesty's crimson and gold jacketed officers were relaxed, feeling as at home as they ever did on a barely civilized planet.

The three of them were classmates, not six years out of the Academy, the gold and silver stripes of lieutenants sewn only recently on their sleeves. Closer inspection would have revealed that one of them was a year younger than his friends, a school prodigy admitted early to midshipman status as much because of his talents as his family influence, and that young Lieutenant Jefferson was very very drunk. His classmates had discreetly opened the top clasp of their stiff tunic collars, but Jefferson's was half unfastened, revealing a none too fresh shirt and the tiny breast pocket computer beneath. His natural shyness overcome by countless thimble-sized glasses of Grua, Lieutenant Jefferson basked in the esteem of the flatlanders, almost forgetting that they were barbarians, that he and the tiny Navy outpost on Prince Samual were the only representatives of true civilization within ten light-years. The others were singing, and when his turn came he added a verse so obscene it shocked the tavern girls, looked wildly about for approval, and tossed off another glass.

Across from Jefferson a young native, browned by field work, too young to be in the Blue Bottle if he were not sitting with the Emperor's overlords, beamed at his new friend and shouted approval of the song.

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"Great, Lieu . . . uh, Jeff, great. Tell us more about what it's like out there. Tell us about other worlds. Is this the most backward place you've ever seen?"

Lieutenant Jefferson belched loudly, murmured an automatic apology, and focused dizzily on his admirers. "Oh Hell no, Simom, not by a full broadside. Samual's got guns, and factories, and, and long-distance communications, and hydroelectric power. Man you've got nothing to be ashamed of. You've got no world government, and those wars you're always in stomp you down or for sure you'd be in Class Two status in the Empire instead of a colony. When I think how bad you got torn up in The War, it's amazing you got this far in a few centuries . . . standard centuries, that is. You're doing fine here. That right, laddy?" he asked, digging his elbow into his classmate's ribs.

Lieutenant Clements turned his black face to Jefferson and grinned, his teeth sparkling. "Sure that's right, Jeff, you tell 'em this is the best duty we've had since we left the Capital. Maybe better," he shouted, turning back to the tavern girl beside him.

"Hear that?" Jefferson asked his companion. "Simom, we've been to places where they don't even have hydrocarbon power, no electricity, no pellet guns, nothing but horses and men running around in iron pants the way you see . . . well, the way we see in Imperial history books, books about the time when Earth was all there was to it. Friend, you almost have space travel. Another hundred years, another fifty years even, you'd have been out to your planets. Another hundred and you'd have found us instead of the other way around. Too bad you didn't," he added, his voice changing. "Been better for you if you had. Class II status for sure, maybe Class I, if you'd had real space flight before we got here. Not your fault, the survey ship just happened by looking for a gas giant to scoop some fuel from and decided to look you over. A real pity." He looked at his empty glass. "Host! Host! More Grua!"

Two of the regulars of the Blue Bottle made a point of walking past the officers as they stamped out of the tavern, their kilts swirling, but Jefferson did not notice them. As the head waiter brought more drinks, Simom asked: "What was it like, that place where they wore iron pants? Is it far from here? Have you colonized it? Can we go there?"

"Ho, one at a time," Jefferson shouted. "Far? Not more than twelve light-years, one jump from here, I think. Let's see, yeah, there's nothing between the two suns and theirs is a big one, Hell, it's that thing you people call the Eye of the Needle, you could see it right now if you went outside. And no, no colonies there, not enough there to make it worth while yet. And, and, we're spread so thin. Keep a little observation post to watch for outies, a First

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Lieutenant and a couple of Middies, few Marines. Not even a ship in orbit. Detection gear, message torpedoes, that's about all. Nothing important there, 'cept, of course, their Temple."

Jefferson had allowed his voice to drop for a moment, a note of weariness creeping in as he thought of the immense task of the Imperial Navy, trying to reclaim the pieces of an Empire lost and shattered hundreds of years before in the War, the Capital itself only reaching for the stars decades ago, His Majesty hoping to knit together the fragments before another Secession War could develop and send mankind staggering back to primitive conditions again. There had been no winners of the last one, and the next would be worse. There must not be a next war, he said to himself. Not another one. Then he brightened, the raucous humor in the room reaching him, the obvious friendship of the natives. Best enjoy it now, they wouldn't be so friendly to the Navy after the Colonists arrived. But that was years away, and the night was young.

"The funny part, Simom, is that the Temple is worth more to them than the whole bloody planet, if they only knew it! They were right to make it a holy place and preserve it, but if they only knew! Why, there's a whole Old Empire subsection Library in that rabbit warren they've built up around what used to be the viceroy's palace! The Service librarians almost went out of their minds, some of the history books and things they found there. Even a few science books, operating manuals for old Imperial Fleet stuff, you name it, it's there, or bits and pieces of it are. And they don't even know what it all is! Wouldn't do them any good if they did, no technology to understand it anyway. And how they guard that stuff! Thought we'd never get any of it copied for the archives. If we'd taken just one of those spools out . . . yeah, spools, the Library was geared to a computer that printed things like your books. Took a lot of work to get *that* fixed, I'll tell you. And those priests watched every second we were there. Never did make copies of most of the stuff, we'll get it some day. Be a great job for some historian. We had to sneak in, convince their bishops we were from the stars—they still haven't told the people in that city about us. And the chaplain had to get in on the act, convince them we were religiously orthodox, gave them some song and dance about how we, too, believed that God spoke from their archives. The chaplain said it was all right, the first thing they copied was a Bible, so he didn't lie about it. Couldn't harm a thing copying the stuff or they'd have boiled up so thick it'd take a battleship to kill them all. Can't do that, they're good people, need everyone out in this sector one day. *Whoosh*, I talk too much, pour me some more. That Grua's the best thing about this planet. Well," he added, looking at the tall blond girl

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who stood at his elbow, "*one* of the best, anyway."

Lieutenant Jefferson was not the only drunken officer in the Blue Bottle, but he would hardly have recognized the gray-eyed man in plain kilts two tables away as a member of the officer class. Colonel Nathan MacKinnie, lately cashiered from Service to the Committee of Public Safety of Orleans, preferred whiskey in large glasses, and had had almost as many of those as Jefferson had of Grua. MacKinnie was tall, centimeters taller than usual for Samualites, but without the remarkably broad shoulders typical of the planetary dwellers. With his straw-colored hair silvering at the temples, he looked more akin to the senior Imperial Navy officers than the natives. He sat quietly, motioning effortlessly for a new drink from time to time, and smoking countless pipefuls of 'robac. At intervals a particularly loud shout from the Imperial table would bring a grimace to his face, but for the most part he sat emotionlessly, giving no sign of the enormous quantities of whiskey he poured down his gullet.

Hal Stark, MacKinnie's one-time sergeant, now servant, companion, and comrade watched his colonel anxiously, mentally computing the amount of whiskey Nathan had drunk, the time since they had eaten, and the earliness of the evening before he turned to his own drink, his second of the day. He was allowing the amber Grua to roll back over his tongue when MacKinnie snapped his pipe against the heel of his hand so hard that the stem broke.

"Damn!" he muttered. "Hal, look at those drunken excuses for officers. And those, those sots, are the rulers of Prince Samual's World, the 'representatives of civilization' as they call themselves, the men who can decree what will be done and snuff out the independence of Orleans like a candle in a hurricane. Babbling, shouting, the overlords of everything we've ever known."

"Yes, sir. Beggin' the colonel's pardon, but I seem to recall a young lieutenant some years ago couldn't hold his liquor no better'n them, if it's all right to say so." It was difficult to tell just how much of Stark's apologetic air was genuine.

Colonel MacKinnie frowned for a moment, then burst into a loud guffaw. "I sure didn't, did I, Hal?" He looked at the ruined pipe in his hands, then signaled for the girl and bought cigars of genuine Earth stock tobacco for a price he couldn't afford. "There were a few times when you had to roll me back to barracks, weren't there? You never missed, either. What are you best at, Hal? Batman, sergeant, or unemployed striker to a colonel with no command?"

"Best at whatever the colonel wants me at, that the right answer? Where are we going next, Colonel?"

MacKinnie shook his head slowly, looked around the room as if there

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might be some answer to the question. "They haven't stopped the fighting on South Continent. Maybe we can pick up something there." He reached into his pouch, and added "We'd better find something soon, or we starve. But it won't be the same, Sergeant. Just something to fight over, get the bills paid. What we do won't matter anymore, the future here belongs to them." He waved his cigar at young Jefferson, who held the blond girl on his lap while he tried to force a glass of Grua between her body and his lips. She squealed.

"Worse for you'n for me, Colonel. I never did know what we was after, not really anyway, not the way you did. Long as you know, it's good enough for the troops." Stark tossed down the last of his drink, then looked back at his officer. "Drink up, Colonel, there's plenty to do somewhere. We could raise up a fair-sized regiment of men who'd follow you to Hell. Tomorrow, I'll round up some of old headquarters company and we'll go show the southies what war's really like."

MacKinnie grinned momentarily, methodically warmed his cigar before lighting it. The bar was pleasant, the company was good, and for a moment he forgot the hopelessness, even ordering a small Grua to dip the end of his cigar into. Inhaling the strong smoke, he leaned back in his chair, his feet stretched out under the table. Stark looked at him again, saw the lines leave Nathan's face, and ordered another round.

It was no good, MacKinnie thought, but there was no point in upsetting the big man next to him. He'd have to play the game out to the end, but by all the saints he was tired now, tired in a way that the sleep and rest and soft duty they'd had for the last weeks could never cure. It was strange, he thought. Colonel of his own regiment at forty standard years, a full citizen of Orleans, inevitably to be senior colonel and then general before his last parade. Not bad for a wandering mercenary soldier whose city-state had been extinguished only months before his graduation from its tiny war-academy, set to wandering in search of a living until he'd ended in the ranks of Orleans' army. Promotion' merit, recognition, citizenship, a good career. And it was all over when the landing boats came down from the ship that still whirled in orbit above Samual. Ten years of brilliant campaigning had insured that Orleans would not suffer the fate of his native Samand. No power, or likely combination of powers, could annex the Republic. And in a week the Imperial Navy had accomplished it, so that Orleans was now the Duchy of Orlean, subject of His Majesty King David IX of Haven, and no Orleanist officers wanted in the Royal Service, thank you. Honor, of course, and an inadequate pension to the hero of Blanthern Pass whose regiment had defeated the best that Haven could put in the field. Well done!, old chap. Of

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course His Majesty has his own colonels, but we have a pension for you, sir. No hard feelings, and, of course, no retaliation against the Orleanists. Well, not much, anyway, and only against a few of the political officers. You were never in politics, were you, Colonel? No, of course not. Too good a soldier. Yes, you can go now. And Colonel Nathan MacKinnie was suddenly an old man, feeling his campaigns and ready to drink far too much. He had left the palace and walked aimlessly for kilometers before he noticed that Stark was behind him.

He could have fought, of course. Even after the Committee bowed to the inevitable power of the Imperial Navy, he could have taken MacKinnie's Wolves to the fields, wandered in the forests, cutting down Haven soldiers, fighting tiny actions with formations too small for the Navy to find and blast out of existence with their space weapons. But for how long? And what would the Imperials do to Orleans? How long would the people of the Republic have supported him, how long before the romantic gesture turned stale and the admiration of the citizens turned to hatred and disgust as town after town was bombarded from space, turned to a blackened cinder as Lechfeld was?

MacKinnie inhaled his cigar, letting the warm smoke drift over his tongue, out his lips and into his nostrils, tasting the incredibly pleasing combination of real tobacco and Grua before destroying the delicate flavors with the harsh tang of whiskey. Across the next table, a couple rose and staggered toward the door, leaving him a clear view of Lieutenant Jefferson. The young Naval officer was telling an admiring peasant about a strange planet, a place where they had no guns, only swords, and they worshiped Christ in a Temple which once was an Old Empire library. Both of us drunks, MacKinnie thought. But the boy's one up. He's going somewhere, and what he does won't be undone by something you couldn't fight, couldn't even understand. Stark was right. There was a resemblance to the old Nat MacKinnie, but not to this one. The old one was going somewhere, and what he accomplished would be his. And so would that boy. Cursing bitterly, Nathan MacKinnie realized that he felt envy for the young men who had conquered his world.

II

The evening wore on. The first round of entertainers finished their acts, it was too early for the late performers, and for many of the customers it was several drinks too late for anything else. The room became less noisy as the early festive crowd departed, leaving the Blue Bottle to serious drinkers and the tavern girls. Only the voice of Lieutenant Jefferson, punctuated by the giggles of the girls at the Navy table, was heard above the low buzz of conversation.

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MacKinnie decided that it was time to go.

He stood in sudden decision, but when he swept his hand behind him for the cloak he had left on a nearby chair he lost his balance, lurching heavily into a small roundfaced man with a tiny moustache. The little man jumped backward with rabbit agility and began to mumble apologies.

"Not at all, sir," MacKinnie told him. "My fault entirely. No offense intended," he added unnecessarily. The little man was unarmed, and the thought of him issuing a challenge to Colonel MacKinnie was humorous. With an effort, Nathan suppressed the laugh that the image generated.

"None taken, of course," the man said. "Would you join me in a drink?" He extended his hand. "Malcolm Dougal," he said apologetically.

The grip was firmer than MacKinnie would have expected. He took a long look at the chap. Nothing out of the ordinary, he thought. A kilt of some family plaid, a muted version of a much bolder tartan no longer worn in public, well suited for business. Expensive jacket, minor jewelry in good taste, a heavy signet ring on the left hand, probably Prince Samual University although there were other places which copied the design. Except for his small stature you could see a hundred like him in businessmen's dining clubs any time you cared to. But MacKinnie noted that he wasn't really so small. He just appeared to be such a rabbit that you took him for a small man, and, of course, anyone standing next to Stark would seem small. There was something else about Dougal, an air, something faintly threatening when you looked at him closely, but that was ridiculous. MacKinnie shook his head to clear the whiskey.

"Thank you, I've had more than enough," Nathan said. "Nathan MacKinnie, I'm sorry, I'm forgetting my manners. Too much whiskey. No offense intended."

"And none taken. Perhaps we'll meet again. Good night."

"And a good night to you. Mr. Dougal." MacKinnie bowed and faced the exit, leaving Stark to collect their cloaks and pay the bill. Outside, they turned toward the harbor, walking slowly to the waterfront hostel where they had rooms more compatible to MacKinnie's meager pension than the brick-and-stone district around the Blue Bottle. MacKinnie had no objection to staying in cheap lodgings, but he was still sufficiently a colonel to want to drink in a gentleman's tavern.

A light rain began to fall, causing the few citizens out on the streets to scurry for cabs. An alcohol steam car whirred quietly by, slowing momentarily as the driver gazed at their faces before deciding they would not be customers. Then a horse-drawn two-wheeler clopped alongside, the coachman shouting at them. "Good rates, sirs. Anywhere you wants to go. Anything you could want to find

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in Haven, I know where it is. Good rates. You'll get wet out there, sirs, you will."

MacKinnie nodded, and the coachman jumped from his bench to hold the canvas doors open for them. "Where will it be, sirs? Blackfriar? Hellfire? Want to meet some ladies? Not them like wat's in Blue Bottle, though there's plenty that likes 'em, I mean real ladies, maybe not welcome back home no more but well brought up, you know." Examining Stark with an expert eye, he added, "And my ladies got real handsome young maids live right there in the house with 'em for your man there, sir."

MacKinnie snapped his fingers, ending the chatter, and the coachman climbed back to his seat. He started the team, leaned down to the window.

"Waterfront," Stark answered. "Imperial Landing Wharf." He was damned if he'd give this garrulous old coachman the name of the cheap hostel they were forced to live in and let him someday say he'd taken Iron MacKinnie to a fly-blown flophouse.

The rain came down harder, forcing the old man to raise the dodger on its carved wooden braces. "Wonder if he gets many customers in this rig," Stark asked.

The old man leaned down and cackled. "More'n you might think, chum. Lots of gentlemen wants to visit my ladies. And lots of real ladies still think cabs is better than them steam buggies. We aren't as fast as those things, but there's people remembers the good old days when there weren't nothing but us and they don't forget old Benny, no, they don't."

MacKinnie snapped his fingers again, and the coachman turned back to the road, muttering to himself, before he again leaned down to his passengers. "Even those Imperial Navy boys, they like the cabs. You hardly see nothing else around Empire House but cabs, oh, they keeps a few steam cars waiting by just in case they have to be in a hurry, but you watch, them young officer kids, they never rode in a cab with real horses before. Get the biggest thrill out of it, as big as they get where I takes them, so they tells me. Been a big lift to the cabbies, the Imperials. Just them being here, that's better'n taking over Orleans, not that the Kingdom ain't going to do right by itself out of the Duchy, no sir." Whistling to himself, the coachman looked to the road again, guiding the team through the twisting narrow streets of the old waterfront town until they emerged on the broad Dock Street, deserted except for a few drunken sailors reeling perilously close to the water's edge.

Across the narrow protected bay which had given Haven its name, brilliant lights played on Empire House and the hundred-meter landing boat the Imperials used to ferry their people from the destroyer in its orbit. The light also played across

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the hemisphere that was Marine Barracks, but none was reflected from the sheer black surface. Imperial Marine Barracks was protected by what the Navy people called a Langston field. MacKinnie knew nothing about it except that artillery shells fired at it were slowed to a halt, and the explosion was absorbed by the black shield and the metal walls beneath. The Navy announced that resistance was useless, nothing short of an Imperial Cruiser would be able to penetrate Marine Barracks, and MacKinnie had reason to know that whatever a cruiser might carry for weapons, nothing MacKinnie's Wolves had been able to bring to bear would harm the fortress. It was one reason the Wolves surrendered.

The landing boats were vulnerable, though, he thought. He had damaged one badly during the short fight around Lechfeld, killing several of the Marines aboard before fire came from the skies, a flaming death which scorched the village and baked a half battalion of Wolves in an instant. But they could be hurt, MacKinnie knew. If only they could have taken Marine Barracks.

Wishful thinking, he told himself. Even if he captured the Barracks and destroyed the last of the landing ships the destroyer up there in the sky was safe from anything the entire population of Prince Samual's World could do. Some of the professors at the University were experimenting with rockets which might, built large enough, go so fast they would never come back to ground, might get to the destroyer. They had built one great war rocket which used liquid fuels and went for a hundred kilometers, but there had been only the one. Even if they had another, how could you make it hit the destroyer? And the Navy said the destroyer was protected by another Langston Field, so that if the rocket hit it there would be no effect. A feeling of helplessness settled over Nathan MacKinnie. He closed his eyes, felt the whiskey reel his head around and around.

He had no idea how long he dozed, miserable, hoping to get to bed before the full effects of all that whiskey did their worst. It could not have been long, he knew, because they were not around the bay to Empire House when the shouting woke him.

It took MacKinnie precious moments to rouse himself from the stupor of half-drunken sleep and realize that the coach had been stopped by several men. Robbers? he thought. Here in Haven, near Empire House? Bold robbers, desperate men!

He snatched open the cab door, tumbling out in a fighting stance, his pistol in his hands for a moment before a heavy cane struck his wrist, deadening it, causing the heavy service pistol to slip from his fingers. On the other side of the coach he heard Stark growl deep in his throat, the enraged sound of a deadly fighting man, and he heard the sharp

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chunk, as his big sergeant's hand, arched into a blade that could crack baked clay, snapped into flesh. Someone over there would not get up again for a long time.

He hoped Stark was giving a good account of himself. Whatever Hal could do, MacKinnie was helpless. A pistol pointed at him from the shadows, and on either side were men with short swords. With a shrug, MacKinnie raised his hands. There was nothing else to do.

He heard Stark strike another blow, then a dull sound which he could not recognize. Moments later, three men carried his sergeant around the coach. One dangled a sandbag from his fingers and looked at the dim figure of the man with the pistol. "He's only out for a little while as you ordered, sir. I wish I could say the same for two of my men. They might never get up again."

"That will do," the voice from the shadows said. It seemed strangely familiar to MacKinnie, but he could not recall it. "Bring Colonel MacKinnie and the others with us, if you please." The figure vanished into a side street, and MacKinnie felt the point of a sword at his back. The weapon was similar to those still carried by the Haven police, and as he thought of it, MacKinnie remembered that short swords had been standard equipment for Haven soldiers until the present king had increased the length of the bayonets his troops carried and relegated swords to dress uniforms. The men at either side of him seemed familiar with their weapons. Very useful if you wanted quiet work, MacKinnie thought.

They walked on for the better part of a kilometer, twisting through deserted streets and getting soaked by the rain before they entered a multi-storied building no different from the others they had passed. They descended two flights of stairs in utter darkness before one of the men struck a light and another produced an electric torch. Three men carried Stark down another flight of stairs.

MacKinnie decided his captors were military men. Their discipline, silent and efficient, was excellent, and it was obvious that this was no robbery. There had been ample opportunities to cut their throats and take what little remained of his monthly pension. Besides, the leader had known MacKinnie's name and rank, had even insisted on examining Stark himself before they started off. Thieves did not take such good care of their victims.

At the bottom of the stairs they entered a dank stone tunnel which seemed to stretch hundreds of meters before it turned, twisted, and ended at the bottom of another flight of stairs. MacKinnie was now genuinely interested in where he was being taken and needed no prodding from behind to climb vigorously, each step working off more of the whiskey until he was better able to

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handle himself. Without the fog of drunkenness he felt more in control of the situation, ready to take any opportunity to free himself.

He was halted in a wood paneled hallway. The only light was from the small electric torch of the guard behind him. They stood for several minutes before a door was opened from the inside, bright light spilling out to blind him, and he was ushered into a large office. Around the walls hung red drapes of rich material, and over the desk was a large painting of King David IX.

Sergeant Stark was draped on a woolsh hide couch along one wall of the office, his shoulders so broad that nearly half of him was spilled over, one arm dangling to the patterned carpet. MacKinnie saw that his companion was breathing steadily, although not yet conscious.

Under the copper edged painting of the King was a rich wood desk, fully two and a half meters by a meter, its gleaming top bare of papers or any other object, and behind the desk stood Malcolm Dougal, still resembling a rabbit, a nervous smile on his lips as he spoke.

"Welcome, Colonel MacKinnie. Welcome to the headquarters of His Majesty's Secret Police."

MacKinnie looked slowly around the room. Two young men, dressed in kilts as plain as those of Malcolm Dougal, stood against the door behind him, their pistols held carefully across their chests in a guard position. Plain kilts or no, they were soldiers, and under their dispassionate expressions MacKinnie detected a slight twitch, nervousness perhaps at the presence of the Secret Police, or, more likely, hatred for Nathan MacKinnie who had defeated their army three campaigns running.

The room was nearly bare, only the desk, couch, and chairs showing, although there might be anything behind the red drapes which ran from floor to high ceiling along two walls. When Nathan said nothing, Dougal motioned toward one of the woolsh hide chairs. "Please be seated, Colonel. Can we get you anything? A drink, perhaps? No, I suspected not. Something else? Earth stock coffee, or chickeest?"

There was a visible tightening to Dougal's lips as he offered Earth coffee, something which told MacKinnie it was a test. Without hesitation Nathan said "Chickeest, thank you. Black, and lots of it."

Dougal relaxed. He waited until MacKinnie was fully seated, then motioned to the guards. "That will be all, Corporal. Remain on call." MacKinnie heard the door open quietly behind him, close. "They will bring the refreshments in a moment, Colonel," Dougal said. "And now, you are wondering why you are here."

"I'm more interested in who you are. I've never seen or heard of you before, and I know of most of His Majesty's officers."

"The two questions are not unrelated. Malcolm Dougal is actually

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my name. My position is rather vague in the budgets presented to Parliament, but as it happens, I am the Director of His Majesty's Secret Police Service."

MacKinnie nodded. "I suspected that Lord Arindell was too stupid to operate as efficient a service as Haven's. So Inspector Solon reports to you when he wants his real orders."

"Yes. You see, I am being honest with you, Colonel. I expect you to be so with me. Had you taken my offer of a drink at the Blue Bottle, I might have brought you here in a more pleasant manner, but I could not take the chance of your refusal. Or of the Imperial Navy noticing either of us. Everything depends on their not becoming suspicious. Everything."

He leaned forward and regarded MacKinnie intently. "I now ask your word of honor that nothing said here tonight will ever be repeated to anyone without my permission except as it may conform to duties I have assigned you and you have accepted. Please," he said urgently.

MacKinnie longed for a cigar, but thought better of displaying the Earth tobacco he had in his pouch. There was something about the way Dougal had pronounced the words "Earth stock" when offering the coffee that warned him. Dougal had leaned back in his chair, but his manner was alert, expecting an answer. MacKinnie said the only thing he could under the circumstances. "You have my word, uh, Mr. Dougal. My word of honor, my lord."

"Thank you." There was a tap at the door, and one of the guards brought in a platinum tray with copper pots of chickeest, pewter mugs, and cigarettes of a popular Haven brand. MacKinnie noticed that everything he had seen since he entered the room was native to Samual.

Behind the guard, the tall thin figure of Inspector Solon, dressed in the midnight blue undress uniform of the Royal Haven Police, stood silently in the doorway. He made no move to enter, and Dougal did not speak to him. When the guard left, Solon went out behind him, closing the door.

"You saw the inspector, of course," Dougal said. "There are two reasons for his being here. First, I wanted you to see that he obeys me so that you know I am who I say I am. But more important, I trust no one else to guard that door until we are finished." He smiled pleasantly. "I trust I have impressed you sufficiently. Enjoy your chickeest, you will be here for some time."

"What about my sergeant?"

"He has already been examined by Inspector Solon, and the man who struck him was an expert. There is no permanent harm. He should be joining us in an hour, perhaps less."

"Then get on with it." MacKinnie sipped the bitter stuff, never as satisfactory as Earth stock coffee. Only a few things were that you found

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among the stars. Men had colonized Prince Samual's World nearly a thousand standard years ago, but they had lived on Earth for millions.

"Tell me what you know of the plans the Imperial Navy has for Prince Samual, Colonel MacKinnie."

"Precious little. They appeared less than a local year ago, and almost immediately settled in Haven. At first they didn't interfere with the planetary governments, but then they made alliance with your King David—"

"Your king also, Colonel," Dougal interrupted.

"With King David. They helped you conquer the other city-states around Haven, and finally did for you what no Haven army had ever been able to do. They gave you Orleans. I don't know who's next, but I presume this goes on until Haven takes all of North Continent. After that . . . who knows, the southies, I suppose."

"And then what will they do, Colonel?"

"They keep telling us they'll help us, give us all kinds of scientific marvels, but I've yet to see any of them. You Havenites have kept them all."

"We haven't, because there have been none. Every assistance the Imperials have given us has been direct, with their Marines operating the weapons and none of my people even allowed to see their new technology. Go on, what after that?"

"Once you have conquered the whole blasted planet, I guess they take you into their Empire, with David IX as planetary king."

"And you find that unpleasant?" Dougal smiled.

"What do you want me to say, Dougal? You've told me you head the Secret Police. You want me to say treason out of my own mouth?"

Malcolm Dougal poured more chickeest, carefully, not spilling a drop, and took a long sip before replying. "Appreciate your situation, Colonel. If I meant you harm, it would happen to you. I need no evidence, and there will be no trial. No one knows you're here but my most trusted men, and if you never leave this room, why, who will know it? I'm interested in what you think, Iron Man MacKinnie, and it's damned important to Haven and the whole planet. Now stop being coy and answer my questions." It was the first spark of emotion MacKinnie had seen in Dougal save for the slight tightening of the lips when he mentioned Earth. MacKinnie paused for a moment, then answered.

"Yes, I find that unpleasant. I can think of more unpleasant things, such as domination of the planet by one of the southie despots, but after what you've done to Orleans, you're right, I find it unpleasant."

"Thank you." Dougal was again speaking in his normal tone, an apologetic note to his voice, but the resemblance to a rabbit was gone. Now he merely looked like a busi-

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nessman. "Would you find absolute domination by an Imperial Viceroy even less pleasant?"

"Of course."

"And why?" Dougal waved in an imperious gesture. "I know why. For the same reason that you drink chickeest, bitter as it is. Because he is an outlander, a foreigner, not of Samual at all, and we belong here. And I tell you, MacKinnie, we will never be dominated by that Empire. Not while I live, not while my sons live."

"So you hope to escape that by using the Imperial Marines and Navy to conquer the planet?"

"No. I had hoped to do so, but it won't work. Colonel, once their colonists and viceroy land here, King David will have no more influence over this planet than your sergeant. I thought you knew little of them. Few know anything at all." He reached under his desk for a moment. Within seconds, MacKinnie heard the door open behind him.

"Yes, my lord," a flat voice said. Before he turned to look, MacKinnie knew it was Inspector Solon. The voice fit him perfectly, cold and toneless, like a voice from a tomb.

"Bring that book, Inspector," Dougal said quietly.

"Yes, my lord." The door did not close, and seconds later Solon crossed the room carrying a sheaf of papers loosely held by a strange clasp.

"Thank you." Dismissing Solon with a wave, Dougal pointed to the papers. "This is the only Imperial artifact we have been able to obtain. It appears to be some kind of work of fiction, about the adventures of a Naval officer on a newly settled planet. But it also gives us much information about the structure of the Imperial government, just as one of Cadace's best sellers would tell them a lot about the government of Haven even though there isn't a line in it intended to do so. Do you understand?" MacKinnie nodded. "Then," the policeman continued, "understand this. The Empire has several kinds of planetary governments within it. There is Earth itself, which is the honorary capital, but is mostly uninhabitable because of the aftermath of the War. For their own reasons they keep some institutions including their Naval and Military academies there, but the real capital is in another planetary system. After the capitals, there are what they call Member Kingdoms, which are planetary governments strong enough to give the Imperial Navy a good fight if the Empire tried to interfere with their internal affairs."

"All monarchies?" Nathan asked.

"There is at least one republic. Many are monarchies." Dougal sipped his chickeest. "Then there are Class I and Class II worlds. We can't tell the difference between them, but they have less authority over their own affairs than the Member Kingdoms. They do have representation on the Capital in one house of a multi-house advisory council, and

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some of their people are officers in the Imperial services. The two classes refer to some differences in technology we do not understand, but the relevent factors are the technology level when admission to the Empire takes place. They both seem to have something called atomic power which fascinates the physicists at the University, and their own spaceships."

MacKinnie nodded, recalling some remarks by the drunken lieutenant in the Blue Bottle. He mentioned this to Dougal, who nodded.

"Good," Dougal said. "You are here because you overheard him. You see, Colonel, after the Class I and Class II worlds, there's nothing left but Colonies. And that's what we'll be."

"What's the status of Colonies?" MacKinnie asked.

"They have none. Imperial citizens are imported as an aristocracy to impart civilization. A Viceroy governs in the Emperor's name, and the Navy keeps a garrison to see that no trouble develops. The colonists are in complete control of everything, and the locals do as they're told—or else."

"How can they govern a whole planet against everyone's will? What good does it do them to burn half the world to ashes like Lechfeld?" MacKinnie drank the last of his now cooled chickeest, then answered his own question. "But, of course, they don't have to fight their own battles, do they? There's always a local government ready to toady to the Imperials. Someone to do their dirty work for them." He looked significantly at Dougal.

Malcolm pretended not to notice. "Yes. There is always one. If not King David, then one of the southie despots. But it won't happen, MacKinnie. I've found a way to win this fight and get Class II status for Samual. I've found a way, a chance, but I can't do it alone. I need your help." Dougal leaned forward across the desk, looking intently at Nathan MacKinnie.

Colonel MacKinnie stood, slowly, stretching to his full height before lifting the copper pitcher and pouring another mug of chickeest. Still moving very carefully, he strode to the couch, examined Stark intently for a moment, then returned to his chair. "Have you a pipe and some 'robac, my lord?" he asked. "It promises to be quite a night. Why me?"

"I hadn't intended it be you until tonight. I had no real plan before, merely gathered a series of actions I might be able to take, made preparations for an opportunity, any opportunity, but now that young fool has told us how to save the state. You heard him, of course."

"If I did, I didn't understand. What are you going to do?"

"But you must have heard. You were there when he babbled about the Old Empire library on a planet at the Eye of the Needle."

MacKinnie thought for a moment,

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then said. "Yes. But I don't see how that can help us."

"You haven't thought about this for months as I have. We found that book not long after they landed, Colonel. It took only a few weeks to understand most of the language. It's not all that different from ours, at least the written forms, which is why the Imperials get around Haven so easily." The policeman lit a 'robac cigar, leaned back in his chair, and glared at the ceiling. "Ever since I could read that thing, I've thought of little else but ways to get out of this trap. There's no way to escape being in the Empire, but by the saints we can make them take us in as human beings, not slaves!"

"If you had the book so early, you must have understood what they wanted before Haven made the alliance with them."

"Of course. It was on my advice that His Majesty entered the alliance. Unless we consolidate Prince Samual's World under a planetary government, we have no chance at all of escaping colonization. And unless it's under King David, I won't have any influence over the planetary government, and you will pardon me if I think I may be better at this kind of intrigue than some of the, shall we say, more honorable men of the other city states?"

"All right," MacKinnie answered. "So you're a master of intrigue. I still don't see what we can do."

Dougal laughed. "You've drunk too much whiskey, Iron Man MacKinnie. You're not above a bit of duplicity yourself. You used several very clever dodges on us. Your record, Colonel—I have it here—says you are more than just a simple combat soldier. But it's pleasing to be able to instruct you." Dougal poured more chickeest. "That library is the key to it all. If we had the knowledge that must be there, our people at the University, and the industrial barons of Orlean and Haven, and the miners of Clanranald—what couldn't they do? We could build a spaceship. A starship, perhaps. And by their own rules the Imperials would have to admit us as a classified world, not a colony. We'd still have to knuckle under to them, but we'd be subjects, not slaves."

MacKinnie took a deep breath. "All right. With knowledge, construction plans even, with a planetary government to bring together the technology of North Continent and the resources of South Continent, maybe it could be done. But we haven't the time. It would take years."

"We'll have years. The Imperials won't move until we consolidate the kingdoms. They're in no great hurry, and I can see that it takes time. It won't be easy, building a thing like that under their noses, but they don't have very many people on this planet and they won't suspect a thing until it's done."

MacKinnie shook his head. "I don't see how you keep them from finding out, but you're good at that.

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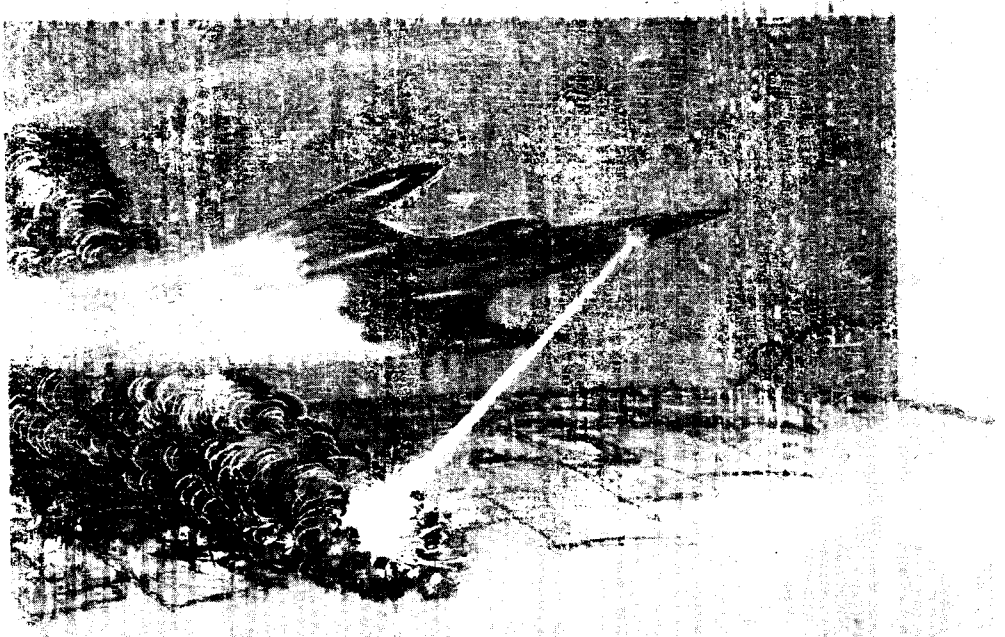

But you can't get at the Library without a ship, and we can't get a ship without the Library. Even if we had one, we couldn't operate it. There's been nobody on this planet who ever saw the inside of a starship for hundreds of years. Until the Imperials came, most of the population thought that history before the War was just a lot of legends. How do you propose we get to the Eye of the Needle?"

"That's the simplest part of the plan, Colonel MacKinnie. The Imperials have already offered to take us there." He smiled at Nathan's startled look. "They're not all navy and military, you know. Some Imperial citizens are traders. There's one batch of them negotiating with King David right now over the rights to Grua. They think our brandy will be worth a fortune on the Capital. They want platinum and iridium, too;

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those metals seem to be very useful to them and in short supply. But there isn't much they can give us in return, because the Navy won't let them sell us what we really want, technology. The Navy rule is, you can't trade anything more technologically advanced than what your customer has already without special permission from the Imperial Council. We offered to buy those little computers they all carry around like notebooks, but they can't sell them. So I've had the king offer to trade them for transportation to a world less advanced than ours, where we can try our luck at selling. They suggested a backward planet at the star we call the Eye of the Needle as the closest, and we've already started organizing an expedition to go there and try our luck at selling."

"The Navy will permit this?" MacKinnie asked.

"Under conditions. Stringent conditions, I might add. We can't take anything more advanced than the natives already have. The Navy inspects our trade mission before it goes to the planet. But they will let us go. It appears that the Imperial Trading Association has a good sized block of votes in the Imperial Council. I don't pretend to understand Capital politics, but the ITA seems to be very influential. They can force the Navy to let us trade with that planet—Makassar, it's called."

"Won't they be watching to see that we don't get near the Library?" MacKinnie asked. The whiskey fog was gone from his mind now, but more than that, he felt useful again, as if there were something he might do which could not be taken away by a whim of fate. He listened to Dougal with keen interest, not noticing that Sergeant Stark was stirring on the couch to his right.

"They haven't mentioned it before. Until that young lieutenant babbled about it in the Blue Bottle, I never knew it existed. I think the Library's an anomaly in their records, not listed as an advanced artifact because it's so old and the people on Makassar don't know how to use it. But, of course, that's a guess. I do know they've been willing to let us go there."

Dougal paused and looked intently at MacKinnie. "That leaves me the problem of one Colonel MacKinnie, who knows about the Library. I decided when I heard about it that we'd have to try to get the knowledge there, and since you know, I'd either have to kill you or send you on the expedition. I don't know how to get those books, and I'm not sure anyone on this planet does know. But I'd rather have you on our side than dead. You were very resourceful against Haven, Colonel; will you swear allegiance to King David and work for Haven now?"

IV

MacKinnie woke to the sour taste of stale 'robac and the sick feeling of

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whiskey in his stomach. He lay for a few moments on the caltworm silk sheets, slowly recalling where he was. There were no windows to the room, and the only light was from a glowplate on one wall. To his right there was a rest room with marble appointments, and through it was a connecting door to a room similar to the one where he was lying. He knew it was there, because Sergeant Stark had clumbered unsteadily to it when they left Dougal's office. They were in the same building, but beyond that MacKinnie had no idea of his location. The only doors outside the suite were locked, and he had no doubt that Dougal's guards stood watch in the hall.

He raised himself on one elbow. To his left a closet stood open, revealing racks of rich clothing. His own kilt and jacket, freshly cleaned and pressed, hung neatly on the door, and with them hung his service pistol. MacKinnie wryly slipped from the bed to examine it, not surprised that there were no cartridges. His watch was in the pouch hanging with his clothes, but it had stopped. He had no idea of the time.

Now that he was up, he decided he might as well stay up. He took his time in the rest room, using luxurious shaving equipment and treating himself to a double dash of the most expensive lotions and powders he had ever seen. If all guests of King David's Secret Police fared as well as he, there would be long lines of people hoping to be arrested for high treason, but he suspected there were more dungeons in the building than guest suites.

As he finished shaving, Stark knocked at the door, then waited for MacKinnie to finish. The sergeant had shaved and dressed by the time Nathan had put on his kilts and was buttoning his coat. Stark seemed no different from the hundreds of mornings they had spent in garrison as he expertly straightened MacKinnie's jacket and made tiny adjustments in the kilt and fall.

"What we got ourselves into, Colonel?" Stark asked. As he spoke he made tiny signals with his hands, indicating the walls, then his ears.

MacKinnie nodded. "I'm not sure, but it beats chasing southies. This could be a job worth doing. Tell me, can you round up some of the Wolves who can keep their mouths shut and act like Trader's guards?"

"Many as you want, Colonel. How many you think we need?"

"All of them, but I don't think the Imperial Navy will let us take a regiment to Makassar."

"We'll get many as you want. Going to be funny callin' you Trader, but I reckon I can get used to it." Stark looked around the chamber, noting the carved wooden furniture, crystalline rock formation patterns in the floor where it was not covered by carpets woven in the Archipelago, scarlet tapestries on the walls. "Fancy quarters, uh, Trader, sir."

"Yes. Well, I suppose we might as well get on with it. We wouldn't

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want to keep Dougal and Inspector Solon waiting."

"Yes, sir. Beggin' your pardon, sir, I hope he don't go with us to that crazy place. Goin' up high like that, off the world even, and then to some place where they don't have guns even, that's enough without that walkin' corpse to give me the creeps."

"He won't be along. Nervous, Hal?"

"No, sir, not if you say not to be. But I am havin' a little trouble gettin' used to the idea."

"That's two of us. All right, Hal, tell them we're ready for breakfast."

"Yes, sir." Stark found the speaking tube in a small recess under the dim light, uncapped it, and whistled. After a second there was an answering note. "Our respects, and the gentleman and me are ready for breakfast." Stark listened for a few moments, then turned to MacKinnie. "He says someone will be with us in five minutes, sir. Seemed polite, anyway." When there was no answer from Nathan, Hal capped the tube.

Four guards were visible when the door opened, at least two of them from the party which had captured MacKinnie the night before. Their weapons were holstered, and they were extremely polite as they invited MacKinnie and Stark to accompany them, but Nathan noticed that as one led the way the other three fell in well behind, eying Stark nervously as they walked stiffly along. They were ushered into the big office MacKinnie had seen the night before. The curtains were drawn back along one wall to reveal a walled veranda where Solon and Dougal sat at a glass-topped table sipping chickeest. As MacKinnie approached Solon stood, nodded to Dougal, and left without a word.

"Good morning, Trader," Dougal said. He stood, waited for MacKinnie to be seated, and indicated a place at a table a few meters away for Stark. "Your breakfast will be here shortly. I trust you enjoyed your sleep?"

MacKinnie smiled pleasantly. "A great deal more than I thought I would when I was first invited here."

Dougal nodded. "There have been others who did not enjoy their stay in this building at all." He dismissed the guards with a wave, turned back to Nathan. "The subterfuge starts from this instant, Trader MacKinnie. We will use your proper name, although we will change your first to Jameson. MacKinnie's common enough in Haven, and there is a great Trader family by that name."

"Are you sure the Imperials won't recognize me?"

"Reasonably. Besides, they aren't looking for a dead man. Colonel Nathan MacKinnie was killed at Lechfeld. Died of his wounds a few weeks after the battle. Tough old soldier, too proud to say anything when he turned over his sword to the Haven General Staff. The records already show that."

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"But there was a young officer who interviewed me . . . and the paymaster will know my pension has been paid for months. Then there's the landlady at our flop."

"There were these people, Trader. Unfortunately, they all died last night in a series of tragic accidents. The Blue Bottle had another accident, I'm afraid. It burned to the ground, everyone in it killed shortly after the Imperial Navy men left. Nothing the Watch could do, the fire was so fierce. It almost seems as if someone deliberately set it, but I'm sure His Majesty's police will catch the scoundrels if that's true. More chickeest?"

"And my men? My former officers?"

"They're being recruited for an expedition to the Archipelago, with offers so generous I'm sure no one will turn them down. If anyone does, well, Trader's expeditions have been known to have reluctant members in the past."

Before MacKinnie could reply, the corporal arrived with their food, and Dougal insisted they eat before resuming the conversation. When they had finished the policeman signaled, and the corporal brought MacKinnie a pipe. It was one from the rooms where he and Stark had left their baggage. It did not seem necessary to comment on it.

"You haven't been very active since you left the service," Dougal said. "It won't be hard to cover your tracks, at least enough to keep the Imperials from looking too closely at you."

"All right, what's the drill for today?" MacKinnie asked.

"Mind your aphorisms, Trader. We wouldn't want your military background to show through, although we will have your records show that you served honorably as a Company Commander in His Majesty's Home Guard during the Theberian War. You won't have to play a part for long, I intend that you leave as soon as possible. We'll send for the other members of the expedition now. Remember, this is a trading mission, and you are Trader MacKinnie. You've met none of them before. Here." Dougal held out a small box. On opening it, MacKinnie found it full of rings, brooches, and other personal jewelry, all in good taste and the kind of thing he might have worn if the military habit were not so strong in him. He selected a ring, brooch, and ear ring and put them on.

"Now you look more like a trader. I have more for your man." Dougal held out gaudier jewelry, flashier but less expensive than Nathan's, and waited until Stark had put it on before beckoning to the corporal.

As the others approached, MacKinnie asked quickly, "What are you to these people?"

"A high officer of the Secret Police. They are all trustworthy servants of the crown, but they do not know the real purpose of this ex-

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pedition." Dougal stood, smiling expansively. "Welcome, gentlemen, freelady. This is Trader MacKinnie, who will manage King David's shares of this expedition. He has financed much of it, I might add. Trader, here are your crew and advisers."

They sorted themselves out and stood expectantly, waiting to be presented. The first was broad-shouldered, of medium height, and stood stiffly erect. Dougal said, "Trader, this is Shipmaster McLean of the Royal Merchant Service. He is qualified in both sail and motor vessels."

"Honored," McLean mumbled, looking straight ahead. His grip was firm, testing MacKinnie's, and Nathan was pleased to note the surprise in the officer's eyes before he let go. The man was so obviously from the Haven Navy that MacKinnie could not understand how the Imperials would be expected to be deceived, but he said nothing.

"And this is Academician Longway, who studies social organization and primitive cultures as well as ancient history." MacKinnie studied him closely. The man was broad and short, typical of the people of Prince Samual's World, black hair and dark eyes, and could have been a miner if it were not for the thick spectacles. His kilts were scholarly, dark with a thin red stripe, but the grip was firm and his voice steady.

"Honored to meet you, Trader, and I must say, pleased to be selected for an expedition as important as this. It's not often a scholar gets the chance to visit a really strange culture. I've been to the Archipelago, to many of the islands there, but it isn't the same, of course. I can't say how pleased I am to be going with you. It's an historic event."

"Let's hope you feel that way when we return," MacKinnie said pleasantly. He never liked men who chattered, but the enthusiastic friendliness of the scholar was infectious all the same. Longway motioned to the man who stood slightly behind him, shuffling his feet nervously.

The man was young, not more than twenty local years, and, although no taller than Longway, was of slight build, and stood with a stoop which made him seem shorter than he was. He also wore thick spectacles, and his kilt was plain, smudged with ink and foodstains. He carried a large book under his left arm, and the end of a bulky notebook protruded from his pouch.

"This is my assistant, Scholar-Bachelor Kleinst," Longway said. "Most brilliant student at the University, I might add. Does very good work."

"Honored, Trader," Kleinst mumbled, holding his hand out perfunctorily and withdrawing it limply as soon as possible. His voice matched his appearance, and MacKinnie instantly disliked him. Nathan turned expectantly to the last member of the group.

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"Allow me to present Freelady Mary Graham," Dougal said. She will serve as your assistant and secretary. I might add that she is a graduate of the University."

MacKinnie had seen lovelier girls, the city of Haven being noted for the beauty of its women, but there was nothing wrong with Mary Graham's appearance. She had the typical brown hair and light eyes of the Haven population, although she was slightly taller than most of the city girls. She wore rather severely tailored clothes which could not hide a pleasing figure, and Nathan noted that she stood attentively, waiting for him to speak, her nervousness betrayed only by a slight motion of her fingers drumming against her skirt. She seemed to be about twenty-three local years old.

"Honored, Freelady," he said, nodding slightly.

"My honor, Trader." Her voice was not unpleasant, MacKinnie decided. But her presence annoyed him. There was no need for women in an expedition as important as this, and he was surprised that Dougal would suggest it. In Nathan's world, women were divided into two groups: freeladies to be protected, and camp followers who were more or less expendable. Mary Graham did not seem to fit into either category.

He was sure that he was being tested again, because a more unlikely group for saving the state could not be imagined. Dougal had explained the night before why MacKinnie himself should command the expedition. The Imperials were likely to know any of Haven's really top officers, yet a military background seemed required if anything were to be accomplished on Makassar. Still, MacKinnie did not look, or act, exactly like a Trader, and the crew assembled before him contained an obvious military officer, a talkative scholar of uncertain abilities, a weakling of almost effeminate appearance, and a girl. Surely, he thought, the Imperials will suspect—but even if they did not—what would be gained by sending this group to Makassar?

Dougal ushered in two more young men, dressed in fatigue uniforms without insignia. "MacReedy and Todd, guards," Dougal explained.

MacKinnie looked them over carefully, decided they were the most authentic in appearance of any of his expedition. He indicated Hal. "This is your guards leader, Stark. We'll add a few more guards for the expedition when we find out how many total we can take. Guard Leader, please take your men to your table and get to know them."

Hal nodded and led the men to the other side of the veranda. MacKinnie turned back to the policeman. 'My lord, I am sure the others will excuse us a moment while we discuss the cargo. There are some difficulties about financing which I

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am sure would only bore them, so perhaps they can be working on their equipment lists while we discuss this in your office?"

"Certainly, Trader." The others bowed, and MacKinnie led Dougal through the veranda doors to the office beyond.

Once inside, MacKinnie exploded. "How do you expect the Imperials to be stupid enough to pass that crew? This is a thin enough plan to begin with, Dougal. I can't begin to accomplish the mission if you saddle me with incompetents. You give me an obvious naval commander itching to learn anything he can about their starships, a weak-eyed little intellectual, and I don't know, maybe the Academician will do, but where did you find that girl? In your freshman spy classes?"

Dougal held up his palm briefly, stopping Nathan. "Sit down, Trader, and have something to drink. Calmly, now."

Still fuming, Nathan sat and stuffed his pipe. "And another thing, I don't appreciate murder. How many people did you kill last night, anyway?"

"As many as necessary, Trader," Dougal said coldly. "Think of them as martyrs to Prince Samual's World, and we'll erect statues for them when this is over." He lit a Haven cigarette, calmly inhaled, and continued. "Now. As to your crew. First, of course McLean's a naval officer. The Imperials will know we intend to send a spy on the expedition. It might as well be a clumsy try so that they don't suspect you. They may let us get away with it, keeping McLean from getting near the ship's controls and engines. It's what I would do." He smiled briefly.

"Now, Academician Longway has been on several expeditions to the Archipelago, and he knows as much about primitives and ancient civilizations as any man on this planet. He's fought his way out of situations in the past, so he may be more use to you than you think."

"All right," MacKinnie said. "I didn't object to him anyway. What about the scholar? A strong wind would blow him away."

"Kleinst is just what he appears to be, except for one small deception. He's not an historian, he's a physicist. The best we have who isn't prominent enough to be spotted by the Imperials. And the boy is sharp enough to learn Longway's patter sufficiently so that Longway says he can fool anyone not an expert. I admit his appearance is against him, but we can't be choosy. You'll need someone who understands what science we know if only to tell you what to bring back."

MacKinnie lit his pipe, watching Dougal intently. "And the girl?"

"The daughter of one of my officers. She really is a graduate of the University, she's reliable, and no one expects a girl to be intelligent. She may have an opportunity to learn something you don't. Women often do, they have methods not available

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to men." MacKinnie started to interrupt, but Dougal waved him to silence. "You may keep your shocked proprieties to yourself," he said. "She's loyal and reliable, if somewhat young, and secretaries are usual on trading expeditions. Have you anyone better in mind?"

"No . . . No. There's no one I'd trust. Which one is your agent watching me?"

"All of them. But you won't betray us. I have enough information on you to fill a small library. The Service has had you in mind as a possible servant to King David since we took Orleans. When you overheard that conversation, I already had enough to act on. I don't waste good men, MacKinnie. Haven needs all we can get for the great task ahead of us. You won't violate your oath."

"Thank you for the confidence." MacKinnie stood. "Just how much do they know?" he asked, indicating the group on the veranda with a wide sweep of his hand.

Dougal smiled. "Enough. They know this is to be an expedition to a primitive world, with the ostensible purpose of establishing a trade mission, and an ostensible secret mission of filling the war chest for planetary conquest. They think the real purpose of the mission is to learn anything they can about Imperial science, customs, military power, that sort of thing. A straight intelligence mission. They've been ordered not to violate Imperial regulations without specific orders, but to keep their eyes open whenever they're around the Navy. You and your sergeant know about the Library, you can tell them about it when you're on Makassar." Dougal lit another cigarette.

"They'll have to do, I suppose. All right, what about my cargo?"

"Primitive weapons, in large quantities. Axes, swords, the like. Armor. Gold and platinum, not too much, we can sell that to the Imperials. Cloth. Good tartan woven from winter sheared woolsh. Grua. Spices. Some trinkets. You'll get the list soon enough, and if you think of anything primitive the Makassarians might buy, or something you'll need, let me know. But don't try to smuggle in anything the Imperials would object to."

MacKinnie sighed deeply and stared at the ashes in the bowl of his pipe. He stood in silence, looking out at the veranda, then turned to Dougal. "It's insane. Oh, it's the best we can do, but you better have a plan B, because I think your main battle plan's got about as much chance of working as I have of swimming the Major Sea."

V

MacKinnie sat alone on the veranda. The others were off on their various errands, leaving him as the only member of the expedition with nothing to do. He finished his chickeest, wishing mightily for a good cup of coffee, when Stark arrived.

"Find any of the Wolves?"

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"Yes, sir. We can get our pick of the noncoms. The officers are a little harder to find. But you sure you want any of the men? Being as how you're supposed to be dead? They're good at fighting, but they ain't long on keeping that kind of secret. Don't know as how good at it I'll be, for that matter."

"What about those Dougal furnished? Any use?"

"MacReedy's typical, uh, Trader. Served a hitch in a trading expedition guard unit on South Continent, another on a sea passage through the west end of the Archipelago. He'll do. Todd's another case. Officer cadet, I expect. Seems a good lad, probably make colonel some day, but his speech and manners don't come from the barracks. Keep him from talking too much, he'll pass."

"About what I expected," MacKinnie said. "No point in complaining. Dougal has his own ideas of how this ought to go, and we won't be able to change anything until we're off planet. Maybe not even then." He thought for a moment. "Hal, get us Dunston, Olsby, I don't know, you pick a couple of the available corporals. I have a hunch we may need some good noncoms, and I'd just as soon not have the whole fighting group made up of Haven people."

"Think we'll have to fight, sir?"

"I don't know. Dougal does, or he wouldn't have me in charge. I don't do anything else. I'll find out more when I meet the Imperial Traders Association representatives, I suppose."

"Yes, sir. When do we get rolling, uh, Trader?"

"Soon enough, I expect. There's no point in waiting. Not enough time for any proper training of the troops, and not enough idea of what to train them for anyway. There's one Hell of a job waiting if we do get back with what we're after, but that's Dougal's problem—he and Solon, and the Magnates." He looked up to see Mary Graham and Academician Longway approaching.

"That was prompt," he told her, forcing a smile.

The girl gave a thin answering show of teeth and said, "As soon as you approve the cargo list, Trader, I'll have the goods placed at Imperial wharf for loading. It's all in the warehouses. Have you any other instructions?"

"Yes. Get someone who knows how to make body armor and find out what measurements he needs. I want a full suit of chain mail for each of us, and that includes you, Freelady. And have a variety of swords of the best quality obtainable, all types available, brought for our inspection. We'll want to choose personal weapons. Guards Leader Stark will instruct you on how he wants his men equipped."

"Yes, sir." She took a notebook from her pouch and wrote with tiny precise motions. "Is that all?"

"No. Join me for lunch."

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"Yes, sir," she said in the same tone, then turned to follow Stark to his table.

MacKinnie turned to Longway. "Academician, is there any special equipment you will need?"

"I'm afraid not, Trader. There are many items we could use, but they are all technological in nature and forbidden. I would suggest you have plate armor made for yourself and your men. If the Makassarians have developed archery to any extent, you may need it."

"An excellent suggestion." MacKinnie lit his pipe. "But I don't intend to fight pitched battles with them. I hope we only need the armor to protect ourselves from thieves and the like. Still, some decent plate might be useful. I'll tell the freelady."

"As for the rest," Longway went on, "we know so little about Makassar that it is hard to tell what we should take with us. Notebooks and paper, of course. A few standard reference works would be useful. Do you think the Navy will allow books? Does Makassar have movable type?"

"No books," MacKinnie said quickly. "Don't ask the Navy about them. Take only handwritten material, and don't ask the Navy about any specific item without my explicit permission."

Longway nodded thoughtfully. "If you say so, Trader. I still have some of my personal clothing and trading items to assemble. Am I excused?"

MacKinnie nodded dismissal and went to the table where Stark sat with his men. Todd and MacReedy were sitting quietly, drinking beer, while Stark issued instructions to Mary Graham. She wrote furiously in her book as he spoke.

Hal had a look of concentration, drumming his fingers as he thought of items of equipment needed for the expedition. "I'd like some crossbows, Freelady—good spring-steel ones. There's an armory sergeant, Brighton, in the Orleans garrison knows how to make 'em, he used to supply them for special forces teams. Thirty of those, I reckon. They ought to have that many in stock somewhere." He paused for a moment, then added "For underneath the armor we want suits of woolsh hide with the fur left on it, good thick stuff. If a man's going to pound on me with a sword, I want some padding under the steel. You go order all that, I'll have some more for you by the time you get back."

She nodded and left. MacKinnie sat at the table, poured beer for himself, and said, "She seems to get the job done, maybe she'll be useful."

"Never had much use for women on campaign, uh, Trader, but she don't miss much. I'll make up my mind when I see the gear, but she got it all in that book of hers. What's the all fired hurry, anyway?"

"The Imperial Trader's ship is leaving soon. We have to be on it, or wait for another." There was another reason as well, but MacKinnie did not discuss it with Hal. Dougal was

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worried that the Navy officers familiar with the Library might talk to the post commandant, or the Imperial Traders, or anyone, and the implications of the Library be realized. It was not too likely, but it was possible, and the sooner the expedition left, the better its chances. In addition, of course, the task of constructing a spaceship could not really begin until the technological knowledge was obtained from the Library, if it could be obtained at all. Dougal and his group intended to begin construction of the hull immediately, and University scientists were secretly working on life support technology already, using hints from the stolen novel to guide them. Other industrial laboratories concentrated on techniques they thought might be needed, but the vital work could not begin until the engines and energy sources of Imperial spaceships were known.

Mary Graham returned for her luncheon engagement, her notebook bulging with subsidiary lists and scraps of paper. MacKinnie held her chair, then looked at her intently.

"You look like you have some sense, why do you want to come on this insane trip?"

"I think it's my duty, Trader," she said carefully. "My Lord Dougal says this could be one of the most important missions in Haven's history, although he wouldn't say why,"

"And just what do you think you can do for us?"

"I don't know, whatever is necessary, I suppose. Most trading expeditions do have secretaries, and my education may be useful to you."

Nathan laughed softly. "I doubt it. And I doubt further if you'd do the only thing I think might really be useful. But leave it at that. Just what was it you studied at the University, and for that matter, whatever possessed you to go there in the first place?"

"I studied a little of everything, Trader. Since there are so few girls in the University, I could study almost anything I liked. My tutors didn't know what to make of me anyway. Such serious old men, you could almost hear them clucking their tongues when they discovered they were expected to listen to a girl read them papers. But since they didn't take my efforts to get an education seriously, I could study what I wanted to and go to the lectures that interested me. Really, it's a wonderful way to study."

"You still haven't said why you went, Freelady."

"Please call me Mary. After all, I do work for you. Don't I?" She sipped cold wine, and MacKinnie noticed that she did so gingerly, unused to it. "Now. Why I went there? I don't know, it just seemed the thing to do. Shocked all my friends . . . the few friends I had, anyway. They're all married now, and I'm a terrible old maid. You can just hear them, 'Poor Mary, she can't catch a man and hold on to him!'

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But I wasn't interested in that. There's so little for girls in Haven, anywhere on North Continent, I guess. No adventure. It was explained in one of Academician Longway's lectures, that the War left so few women on Samual that men kept them at home so no one would see them, and it's only recently we were allowed to go out on our own . . . I don't know I believe it, but that's what he said . . . anyway I'd like to do something more than just raise children and help my husband get promoted by flirting with his superiors. I thought the University would help, but it just made people think I was a crimp. That's why I wanted to go on this expedition so badly." She stopped, out of breath, and smiled nervously.

"What does your father think of this? Going off on another planet and entering service?" MacKinnie appeared to be relaxed, but he watched the girl closely, sure that she would be more hindrance than help. By her own account, her education at the University didn't seem to be anything which would be useful to the expedition.

"He gave his approval, Trader," she said stiffly. "I have all the necessary permissions, duly notarized. Are you afraid he might challenge you?" Her eyes flashed briefly, then she thought better of what she had said. "Oh, I didn't mean that. Please don't be angry with me, but I get so tired of having to ask father's permission for everything I do."

"I take it you would prefer some such equality of sexes nonsense like Therean."

"Not that equal, Trader. I've no wish for the life of a camp follower, or a tavern girl. But . . . but surely there's a place for us in some honorable work. Not all of the secretaries in Haven were born in the charity wards. If freeladies can manage affairs for Magnates and Traders, why can't they own property themselves? Academician Longway says they did in the Old Empire. Why there were even women in Parliament."

"Do you believe that?"

"Well, it seems a little strange, but why not? We're not brainless, you know. Not all of us, anyway. Who managed the estates in Orleans when the men were off on campaign? You know as well as I do that not all of the wives and companions had guardians . . . if they could manage their property as long as the men were alive, even when they were away for months, why couldn't they do it after their men were killed?"

MacKinnie laughed and turned his attention to his pipe. "Management is one thing, ownership is another, Freelady Mary. If you own something, you can sell it. How far along is the cargo?"

She reached into her pouch and shuffled through papers until she found a bulky sheaf. "Here is the list. The items checked off have already been moved to the Imperial Landing dock."

"And the armor?"

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"Lord Dougal has arranged for the Haven armory to prepare the chain mail. They seem to have found something which works, and one of their people will measure us this evening. The tanners will be along to measure us for the under padding as well. And Duncan and Larue are forging swords to various patterns, and have sent over all the varieties they make. We've located crossbows, and they're making bolts for them."

"Duncan and Larue," MacKinnie mused. "I can remember when I was younger, there were whole regiments of cavalry armed with sword and pistol. Battles decided by them. There's one firm will profit by this expedition if we find something worth importing."

Hours later, Dougal arrived. "You will meet the Imperial Traders shortly," the policeman announced. "We have fresh clothing ready for you in your quarters. When you get changed, we'll go to Empire House." The policeman fell in beside MacKinnie, walking with him to his suite. "Be careful with these Imperial Traders. There are two of them, and they both look soft. Don't believe it; they didn't get rich by being stupid. Of the two, Trader Soliman is probably the actual leader although they claim to be equals. There is antagonism between the Imperial Traders and the Navy, but I wouldn't count on it too much. We don't know the real story, but the Traders seem to be with us against the Navy."

MacKinnie nodded. "As far as we know, the Navy wouldn't let us go on this trip if the Traders hadn't pushed them into it."

"Yes. They are eager for us to go. Quite generous in their terms. I'm not sure why."

"When a businessman wants to do you a favor," MacKinnie said, "I've found it a good policy to watch your pocketbook."

They arrived at the door to his suite, and Dougal waited outside while MacKinnie went in to change.

MacKinnie found a septless MacKinnie dress kilt, doublet laced with gold and silver piping, and jewelry in the style of the great merchant princes of Haven. When he lifted the clothing, he found cartridges for his pistol laid discreetly on the bed. With something approaching relief, Nathan loaded the large calibre revolver and buckled it on before he realized how out of keeping it was with the rest of his clothing. A quick search of the small leather case he found on the bed with the kilts revealed a smaller dress pistol, its dragonwood handles inlaid with pearl and jade. He unloaded it and squeezed the trigger several times, pleased with the smoothness of its action. The proofmarks showed it to have been made by the Brothers of St. Andrew, reputedly the best gunsmiths on Samual and certainly the most expensive. Although he hesitated to carry a weapon he had never fired, MacKinnie buckled it outside his

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doublet, sadly leaving the big service pistol hanging in the closet.

Two sets of guards were on watch at Empire House. Outside the large walled courtyard, soldiers of King David's personal guard stood rigidly at attention. A junior officer in a tiny office just inside the gates examined their passes, collected their weapons apologetically, and directed them across the lava stone courtyard to the building itself. Two huge doors swung open as they arrived, and Dougal and MacKinnie were searched by Imperial Marines before being admitted to a large entry hall. Two more Marines in full battle dress lounged inside, and the entry hall seemed to be watched through gun ports at its end as well, although they could not see into the chamber beyond. They waited for several minutes, standing in silence in the presence of the Marines, until a young Naval officer appeared to escort them. MacKinnie recognized the officer as one of the three who had been at the party in the Blue Bottle, but if the man had noticed him he gave no sign. They were led into a large room.

Two fat men in plain clothing, wearing trousers rather than kilts, undecorated coats, and only a few jewels, their almost drab appearance contrasting strongly with MacKinnie and Dougal, rose languidly as they entered a large plainly decorated room. The Naval officer waved them in, looked sternly at the civilians for a moment, and left without a word.

As soon as he had left the room, one of the Imperials laughed. "God bless the Navy," he chuckled. "But may He grant that their lieutenants come of age soon. Good evening, gentlemen."

Dougal returned the greeting, then said formally, "Imperial Trader Soliman, I have the honor to present Trader Magnate MacKinnie, His Majesty's servant and manager for this expedition. Trader MacKinnie, Imperial Trader Soliman of the Imperial Capital, and as I understand it, an officer of the Imperial Trading Association."

MacKinnie watched them narrowly and noted that the fat man made no movement to offer his hand. MacKinnie bowed slightly, was rewarded with an even smaller bow, and turned to the next man.

"Imperial Trader Renaldi, I present Trader Magnate MacKinnie," Dougal purred.

"My honor," Renaldi said. When Nathan began his bow, Renaldi matched him, bending to within a degree of MacKinnie but not quite as deep. The difference might have been measured with calipers.

"Gentlemen," Soliman said, "this room is at our disposal for the time. Let us sit and enjoy ourselves like civilized beings." He indicated couches drawn up in front of an open fire. As they sat, he continued, "Remarkable how peaceful it is to have a fire in the room with you. We haven't used them in the Capital for

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so long there are only a few houses with fireplaces. I can't remember when I last saw one lighted. I will have to have one installed on my return, a great aid to contemplation. Right, Chasar?"

"It would be pleasant," Renaldi said.

MacKinnie noted that both men spoke the language of North Continent almost perfectly, but with the careful pronunciation of words that indicated that it was a recently learned foreign tongue. Having never heard the Imperial language, he was not sure how close it would be to that used on Samual, although it obviously would be similar if Dougal were able to read the book his agents had stolen. Still, it must require some study, he thought, and therefore it followed that the Imperials either had some method of learning languages quickly, or that the Traders thought it important enough to spend the time and effort learning the local tongue. Either alternative seemed interesting.

Soliman hovered around them, offering refreshments which he poured himself at a small stand at one side of the room before finally joining them before the fire. They sipped chilled wine from one of the islands of the Archipelago, and Soliman praised it highly. "I hope it travels well," he told them. "This will be worth a fortune on the Capital. It is as good as the real Earth wines, or nearly so, and they command a price you would never believe. This is a very fortunate world, gentlemen, your wines and brandies are very close to those of Earth. And your Grua . . . do you think the peach-plant would grow elsewhere? Ah, but it would never thrive as it does here. If only Earth had not been so devastated in the War." He lowered his voice confidentially. "That is why the Navy is so stern, you know. Their academy is there, and they grow up with the results of the War. They are determined that it will never happen again, even if they have to enslave the entire galaxy to see to it. And now that it is traditional for the Emperor to send the heir apparent to New Annapolis, the whole government is infected with their dedication." He sighed deeply.

"Have you visited Makassar yourself, Traders?" MacKinnie asked.

"Briefly, briefly," Soliman replied. "A desolate place, with little of value. Yet perhaps you will find something useful there," he added quickly. "Not so desolate as all that. And iron abounds there, although the costs of shipping will prevent you from importing it on any really large scale. There is little for us, but we believe you will find the voyage profitable. We did not venture from the city where the Navy has its base."

"Has the Navy decided on the details of the voyage?" Dougal asked. "Will your excellencies accompany us? A Naval officer, perhaps? Who will command the ship?'"

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"I have business beyond Makassar, but I will go with you there," Renaldi told them. "I am looking forward to the voyage, and Trader Soliman will guard my interests here." Renaldi's tone indicated that he and Soliman had tossed coins for the privilege, and Renaldi lost, although he was attempting to act in good humor. "As Soliman and I own the ship, it will be commanded by our own merchant captain and crew. One of the Imperial Navy officers will be aboard as observer, to insure that none of their silly regulations are violated. We must caution you, Trader," he said, turning to MacKinnie, "they are very stern about their rules. Do not attempt to violate them, or you will never see your charming planet again. The Imperial prison world is not a pleasant place."

"No need to speak of such depressing matters," Soliman interrupted. "Better to think of the profits that can be earned. And of course, this will be the first time any of your people have been off this planet since the War, will it not?" His offhanded manner could not conceal his interest in the question.

Before MacKinnie could answer, Dougal asked, "And the language of Makassar? Will Trader MacKinnie find it difficult to deal with the natives?"

"The language is much like your own, or ours," Soliman answered. "Degenerate forms of Old Empire, with some local words. It requires study, but there will be no great difficulties. Tell me, Trader Magnate MacKinnie, are you looking forward to going off-planet?"

"With some anticipation," MacKinnie answered. "It will be a new experience for me." He emphasized the last word slightly, receiving an approving nod from Dougal. "But what are the conditions on Makassar? Are they likely to be friendly? Will we be allowed to wander about their cities, or must we remain in one place and let them come to us?"

"The Navy has no objection to your traveling about," Renaldi replied, "provided you take nothing more advanced than they already have on Makassar. Journeys on the planet with primitive equipment can be dangerous, you understand. The planet has no political system as even you on Samual might know it. Here, you have a few strong governments and many city-states in a complex of alliances—at least on the North Continent. On Makassar, there are dozens of kingdoms, free cities, small republics, leagues, and such, none very large by your standards. The kingdoms themselves are more fiction than fact, with independent baronies scattered about them. No doubt this is the result of their lack of technology, coupled with their primitive military organizations. All of this is huddled together on the coast of the one large continent. But it all comes to an end on a great grassland plain that stretches west for over two thousand kilometers. You will find no one but barba-

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rians there. No one knows how many of them there are, they move around at will and raid the edges of the civilized lands. There are also island kingdoms of barbarians off the coasts of the civilized regions, and these stage raids even on the largest cities. You are welcome to wander the countryside, Trader MacKinnie, but do not be surprised if you are killed. The only safe place is in one of their large cities, and they are not entirely safe. The Imperial Navy maintains a fortified observation post, but no warships, so that even if you were able to signal the Navy, there would be little they could do to rescue you. Makassar is not altogether a healthy place."

"Ah, but there are never profits without danger," Soliman purred. "And who knows what you may find out among the kingdoms of the east? The Navy post is on the Western coastline, and we know little about the planet."

MacKinnie nodded. "We will be very careful if we leave the Imperial fortress. Gentlemen, what I do not understand is why Makassar is so primitive. Why did they not retain any basic technology at all?"

"Ah," Soliman answered, "that is something we have speculated about without final answer. From our records, it was relatively unpopulated when the War began. The planet seems to have served mostly as a rest area for the Old Empire Navy and Civil Service . . . a park world, kept uninhabited and unspoiled. Little machinery. Few power installations. Then, as the War continued, for some reasons of strategy we do not know, parts of the planet were fortified. The fortifications were destroyed, and with them, much of the only city, although the old Palace seems to have survived. Then the War boiled on past Makassar. Perhaps there were not many people left on it. Many of them would be civil servants. Few artisans, and of the native inhabitants, most would have been dedicated to service professions. Pleasure house operators. Prostitutes. What kind of civilization would you expect them to build, given the destruction of most of the machinery?" He paused thoughtfully, sipping his wine.

"And then too, much of the vegatation on the planet is native to Makassar. Not edible by us. Hardy stuff. A form of our wheat grows across the plains, but it is straggly stuff more fit for horses and cattle than men. Most of the crops of Makassar are Earth stock, they have a very wide variety of such foodstuffs but getting an edible crop takes constant attention. How natural for some of the population to become raiders, living off the cultivators! And so the cultivators divert part of their efforts into maintaining a warrior class.

The warriors become an aristocracy. The warriors must have something to do in times of peace, and they will not toil in the fields . . . indeed, they can't, because the

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barbarians may sweep over them at any time, and the warriors must know their business if they are to do their job. The planet has known constant warfare, between the civilized people and the barbarians, among the warriors within the civilized area, between civilized cities and baronies. At least, we think that is what happens. Certainly they are fighting all the time."

"There was a period much like that on old Earth," Renaldi observed. "It would seem to have been ended by the development of scientific farming, which was a discovery of the Church. But Makassar has developed its own ideas of a church, not altogether to the satisfaction of New Rome."

"Ah, yes," Soliman added. "In addition to yourselves and the Imperial Navy observers, you will find one other group on Makassar. His Holiness has sent a bishop and a small group of missionaries to win these people back to the state religion. They are not having notable success."

Dougal finished his wine and set the glass down. In an instant, Soliman hauled his great stomach off the couch and gathered the other glasses on a copper tray, taking them to the cabinet to fill them. As he did, Dougal observed, "I am sure that Trader MacKinnie will be careful not to fall afoul of His Reverence the Bishop. May we here on Samual expect a similar visit soon?"

"Doubtless," Renaldi answered. "Of course, you seem to have developed along more orthodox lines than the people of Makassar, although the Church will find the multiplication of sects distressing. Still, you will find New Rome tolerant and willing to compromise. Do you anticipate much resistance to unification of the churches?"

"Not much," MacKinnie answered. "We had religious wars, over a hundred standard years ago. Not much zeal left on Prince Samual's World. The straight orthodox churches have been proclaiming their obedience to New Rome since the Imperial Navy landed, and the others don't know quite what to make of it all. How much will the Empire interfere with local matters like religion anyway?"

"Oh, hardly at all, hardly at all, Soliman assured them. He served the wine carefully, and MacKinnie caught a stern look which Soliman passed to Renaldi. The latter quickly changed the subject, and the next half hour was passed discussing trade goods and the proposed cargo. They were interrupted by a knock at the door, and when Renaldi answered it, two Imperial Naval officers entered the room, strode over, and stood abruptly before MacKinnie.

VI

The contrast between the two officers could not have been greater. One was young, tall, of slight build,

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his hair an indescribable brown something like damp straw. The other was much older, lines of care etched around his expressionless eyes, his hair gray where there was hair at all. He was heavy and short, but he had in common with the younger man a look of hardness and dedication; yet, again in contrast to his junior brother in service, there was none of the air of expectancy and anticipation the boy displayed.

"Trader MacKinnie." The older man said it factually. "I am Captain Greenaugh of His Imperial Majesty's Navy. I command the garrison here and the *Tombaugh* up there in orbit. This is Midshipman Landry, who will be my observer on this stupid voyage of yours."

MacKinnie stood and bowed slightly to Captain Greenaugh, even less to Landry, making no move to extend his hand when the others did not.

"Won't you sit down, Captain?" Soliman asked softly. "Some wine, perhaps? Grua?"

"No. Mr. Landry and I are on duty."

"Then please be seated." Soliman insisted.

"Very well." He turned his attention to MacKinnie. "As you are to be the local in charge of this expedition, sir, it is my duty to caution you that any infringement of Imperial regulations on the part of any member of this expedition will result in trial and punishment of both the crewmember and you personally. Is that understood?"

"Yes, Captain," MacKinnie said. He elaborately inspected the large ring on his left hand, looked up. "I understand perfectly. Tell me why you are so unhappy with me, if you please."

"I am not unhappy with you, sir. It is understandable that you would wish to travel in space. I am unhappy with Mr. Soliman for browbeating me into letting you do it."

"Browbeating, Captain?" Soliman said in an amused tone. "Why I merely indicated—"

"You merely indicated the relevant passages in the Imperial Regulations and reminded me of your influence on the Capital. I don't give a hang about your influence, but I can't ignore the Regulations. But I warn you, MacKinnie, if Mr. Soliman can be sticky about Regulations, so can I. You'll get a copy of the pertinent sections before you go, but I decided to tell you personally to try to talk you out of this venture."

"If you please, Captain," Dougal asked, "why are you so opposed to our simple trading expedition? I thought it was Imperial policy to encourage trade among the worlds. Your ambassador has made it clear that the Empire will see to it that Prince Samual's world profits highly through joining the Empire."

"Sir—" The captain paused and snapped his fingers.

"Lord Dougal, sir," the midshipman answered. "In the service of King David."

"Lord Dougal, I have all too few

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officers on this station. I am responsible for the protection of this world from all interference with its development and assimilation into the Empire. There's a nest of outies not twenty parsecs away, your King David is in one Hell of a hurry to unify this planet against stiff opposition, the survey team keeps borrowing my people, and thanks to this expedition I have to send a junior officer off for the saints alone know how long. There'll be reports to file, inspections to conduct. And for what? So Mr. Soliman here can add another megacrown to his bank account, and you people can bring some kind of gimcrack new luxuries to absorb what little capital there is on Prince Samual's World. I don't like it and I don't have to like it."

"Sorry you feel that way, Captain," MacKinnie said. Inwardly he sympathized with the man, as he did with any military man caught up in the details of government, until he reminded himself of the status of his home under the Empire, and the Navy's part in the subjection of Orlean. "But you said you understand our motives for wanting to go. I hope we can get our work accomplished without causing you any trouble."

"You're damn right you will," Greenaugh snapped. "But before you make your final decision, let me acquaint you with the Regulations. Item: you will be supplied with a basic Naval study of the planetary languages found in the chief city of Makassar. You will at no time teach any native your own language, or the Imperial speech. All negotiations will be conducted in one of the planetary languages. Is that understood?"

MacKinnie nodded, suddenly realizing why all the Imperials he had met spoke a variant of the language of Haven. If you used a man's own language, you weren't likely to tell him anything he didn't know about. He wouldn't even have the words for most advanced concepts.

"Item: as Imperial subjects," Greenaugh continued, "you would ordinarily be entitled to protection from barbarians and arbitrary imprisonment. In your case we can't extend it. The garrison on Makassar is too small and there's no ship. If you get in trouble, you're on your own."

The captain took a small notebook-sized object from his pocket, touched a stud on the side of it and glanced at its face before returning it to his scarlet tunic. MacKinnie recognized it as one of the tiny Imperial computers, supposedly equivalent to hundreds of the best mechanical calculators in use in Haven's banks.

"Another thing, MacKinnie. Any technical innovation traced to you directly or indirectly can result in a charge of interference. If it results in any severe disruption of the development of that planet, you can get life imprisonment. Assessment of the effects of innovations and your responsibilities for them are up to the Emperor's Lords Judges.

"Why are the Regulations so se-

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vere, Captain?" Dougal asked. "It is our understanding that the Empire intends only peace and friendship for its member worlds."

"Damn right. And sudden technical changes destroy both. I've seen worlds where some smart guy used a little technology and a lot of guts to set himself up as a planetary king. Half the population out of work. the other half in a turmoil. Took the better part of a fleet and a division of Marines to keep order on the place. It won't happen in my sector, Lord Dougal."

"The Regulations are severe for a purpose," Renaldi added. "There is no telling what the effects of even the most innocent technical revelations can be. Even something as inherently benign as medicine can change the whole pattern of life. One place, back in the early days, the Church went in and taught them some practical medicine. Particularly how to save their children from infant diseases. They intended to give them some new agricultural and industrial techniques, but the people were not ready for them. They rejected the agriculture and industry, but they adopted the medicine. Within fifty standard years, there was famine all over that world. The results were horrible."

Greenaugh nodded. "Still were when I was young Landry's age. I served a hitch on an escort vessel convoying a provisions fleet. Silliest thing you ever saw. You ever think of how futile it is to try to ship food to a whole world that's starving? If you took every ship in the Navy and Merchant Service and put them on it, even if the food were free and waiting in the same star system, it wouldn't do any good. But the Emperor's sister got interested in the place and they had to have a try at 'helping'. Did no good at all. Population's thinned out a bit now on Placentia, but the planet'll never be the same."

"So you see," Soliman said softly, "it is important not to interfere. No matter what the reason. You can always say that things would have been worse if you did not interfere, but you can't know." He sipped his wine. "Besides, people will have adjusted to the evils they are accustomed to. Your attempts to help may introduce evils they don't know, which are always worse to bear and will probably retard their natural development."

"Thank you," MacKinnie said. "We will be very careful. What else must I know?"

"Still determined," Greenaugh said. "Thought you would be. Well, if I can't persuade you to give it up, I can't. Bring your crew here tomorrow for inspection. Midshipman Landry will tell you the rest of the details." Captain Greenaugh stood. "Just remember, MacKinnie, you were warned. The Hell with it." He strode briskly out, followed by his midshipman.

MacKinnie started to speak to

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Dougal once they were in the cab and drawing away from Empire House, but Dougal motioned hi n to silence. They returned to the Royal Guest House, where Dougal invited MacKinnie to shower, insisting that he do so in a manner that told MacKinnie it was an order. When he finished, he found fresh clothing, the elaborate Trader's kilts and doublet gone. Dougal joined him as he finished dressing, and MacKinnie noted that the policeman had changed as well.

"Sorry, Trader," Dougal said, "but we have found by bitter experience that the Imperials have devices so small you would hardly notice them which in some manner allow them to hear what you say over long distances. Our engineers did not believe it at first, but I tested the hypothesis by feeding them false information when we had reason to suspect. I proved it, and now my people have found one of the things. Not as big as the end of your thumb."

MacKinnie whistled. "Was there one attached to our clothing?" he asked.

"No, not this time. But the cab stood outside Empire House while we were there. They had ample time to do as they liked."

"Any idea of the range of these things?" MacKinnie asked.

"None. And as we do not know how they work, there is no guess. Some of our best physicists insist they have a theory of how one might be built, now that they know it is possible, but they say any such device would be very large and use much power. Still, it is a start." Deprived of a place to sit, the policeman locked his hands behind his back and paced the room nervously.

"By the way," MacKinnie asked, "what will our churches really do if their New Roman Church decides to take over here? I notice King David's bishops are thick as flies in Orleans."

"Better ours than the outlanders," Dougal snapped. "And all the more reason for the success of your mission, MacKinnie. Perhaps they are not as severe on the Classified worlds."

"Yeah." Nathan stood against one wall, patiently watching Dougal stride back and forth. "But after that interview I don't know any more about how to get those books—but they aren't books, are they? That Navy kid, the night he babbled about it all, said they were spools, whatever that might be. That they could be made to print books, if we knew how to do it. Well, the sooner we start, the better chance we'll have. It's still a fool's errand, but by God at least I can feel useful again, win or lose!"

TO BE CONTINUED

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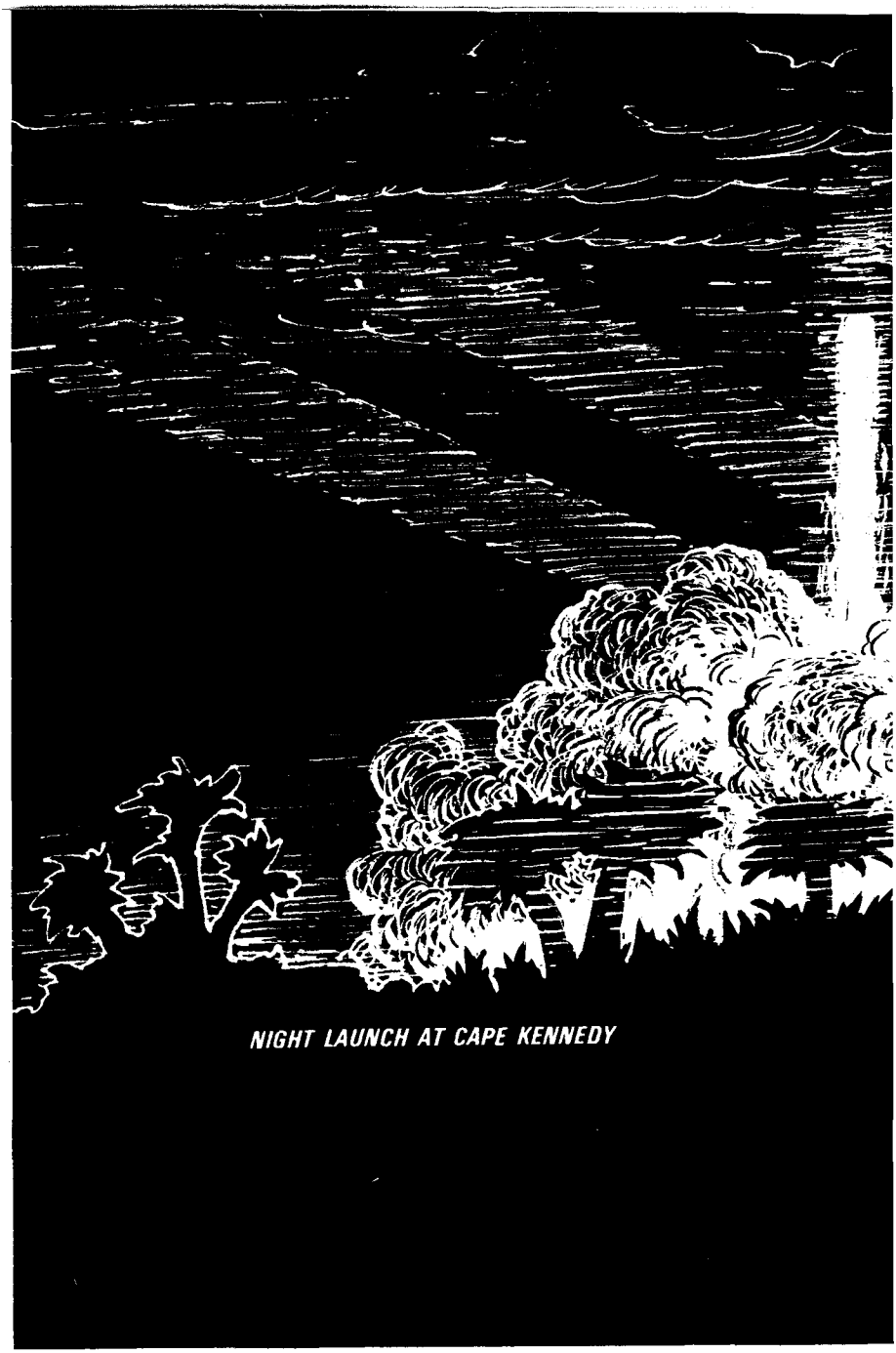

NIGHT LAUNCH AT CAPE KENNEDY

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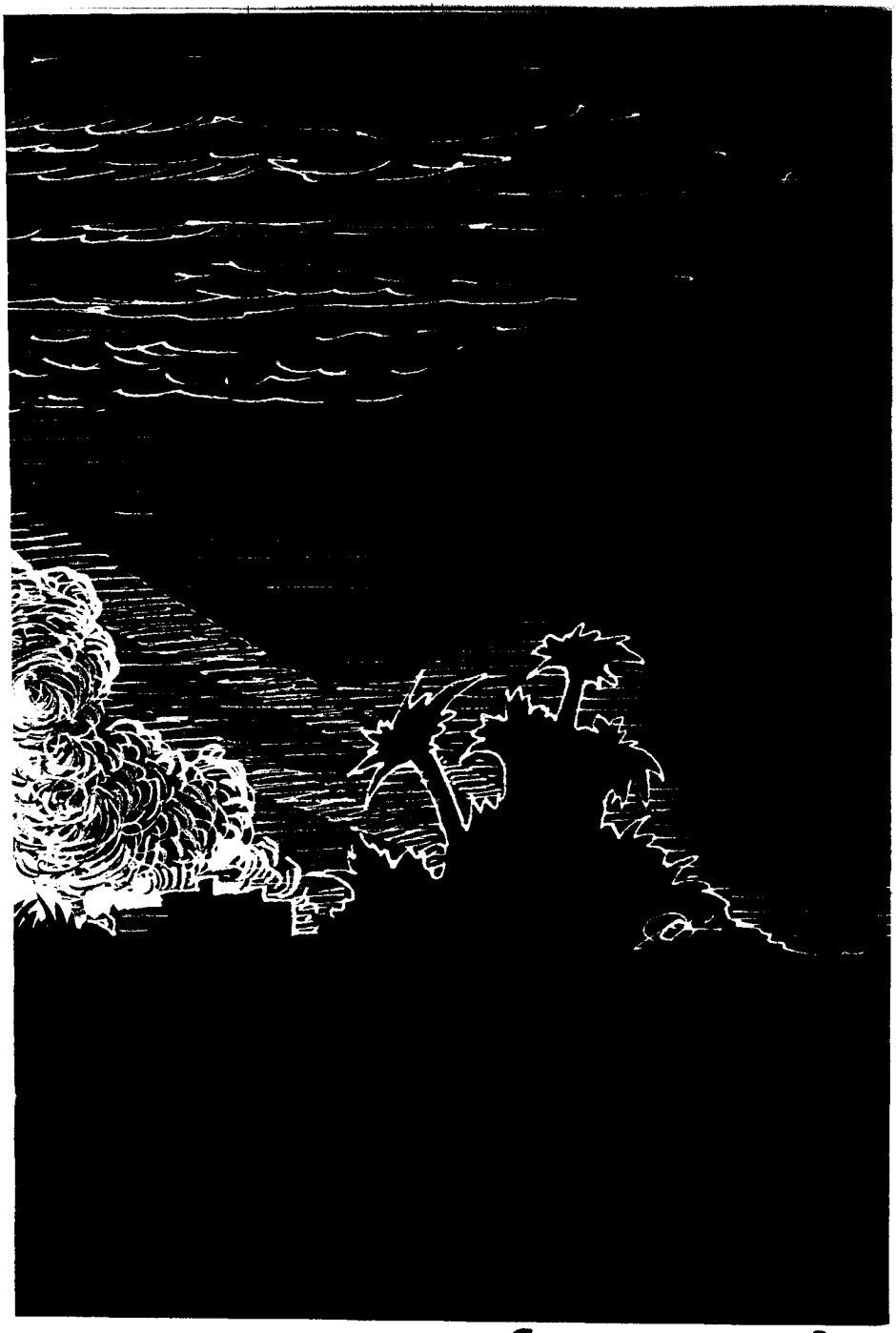

a matter of perspective

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Some Cape Kennedy constructions are so big they trick the eye. Perhaps the same thing is true about some potentials of the Space Program itself?

GORDON R. DICKSON and KELLY FREAS

The day of the launch of Apollo 14, buses for the working writers got us to the press site, three and a half miles from the bird, four hours before launch time. With at least two hours yet to go before lift-off, I was sitting in an upper part of the press stand, still talking to artist Kelly Freas about the VAB, or Vehicle Assembly Building, which lifted out of the flat Cape Kennedy landscape to our left.

"I don't understand," I was saying to Kelly. "From here it still looks like a big building. But it doesn't begin to look half as big as I know it is, after being inside it. Can you figure out why?"

"I'm not sure," said Kelly. "It could be a matter of perspective. If you're close enough to compare the building to anything beside it, you're too close to see it all at once. If you're far enough back to see it all, anything else beside it is too small to measure it by. So your eye gives it dimensions you can believe in."

He was right, of course this gigantic building sits on the horizon like a department store in the middle of a parking lot—in this case a parking lot five miles wide; and is unbelievable. Its magical proportions and ingenious use of space have already earned it an architectural award for functional design. Every change of viewpoint, atmosphere and time of day presents unexpected realignments of plane and texture. It looks delicate and airy from a distance; but by the time you are close enough to be aware of the reality of steel and concrete, you have lost awareness of it as a total structure. The fact that it covers eight acres doesn't mean much until you notice that the place is uncommon quiet; it's so damn big it doesn't even echo!

The discussion Kelly and I were having about it was not exactly an idle one. We were both down in Florida to cover the launch for Analog. It had been decided that an artist like Kelly was needed to capture in sketches what defied the best of camera work—the sheer, unbelievably outsize dimensions of some of the hardware involved in the space program.

I was concerned with matters of

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size,—and with something else. A question that had kept coming at me in the last two years, particularly, from radio and TV interviewers and non-science-fiction readers among the audiences to whom I sometimes spoke.

"What can you science-fiction people think up to write about," the question ran, "now that man has landed on the Moon? Isn't all the science fiction told by this time?"

The same question had been put to me in somewhat more practical terms by a news editor I had talked with before coming down.

"It's a problem," he said. "Naturally, we have to cover the Apollo shot. On the other hand, the public has pretty well had this Moon flight business. It was all right for space-age poets, like yourself, before the actual thing got going. Now the engineers have taken over. There's not much poetry in engineering."

I had come down to Kennedy feeling instinctively that editor was wrong; but unable to say why. However, when I got to the Cape, what I found there first seemed to support his attitude, rather than mine. The first exhibit we stopped at was the launch site from which Alan Shepard had lifted for his first suborbital flight on May 5, 1961. Looking at the site right now, I realized that it jarred me to see the blockhouse so close to the launch pad, and that on the edge of the pad itself, less than a dozen steps from the center of it, was a fire hose behind a thin, metal shield. But the largest jolt came from the sight of the rocket itself standing upright on display there, a Redstone launch vehicle, duplicate of the one with which Shepard had actually reached an altitude of 116.5 miles and a speed of 5,100 m.p.h. for five minutes of weightless flight.

Reaching back ten years, I went up to the launch vehicle and put my hand on its painted metal side, already hot from the morning hours of Florida winter sun. The Redstone rocket, standing on its tail and exclusive of the spacecraft it carried, was 69 feet tall and 70 inches in diameter—and those figures had always seemed impressive enough. But, as I stood there in the sunlight touching it, it struck me what a flimsy vehicle it was in which to fire a man a hundred miles up and three hundred miles downrange. For the first time, I began to realize how the engineering developments of the space effort had changed my own point of view, even as they had affected my radio and TV interviewers, and the editor I had spoken with before coming here. Once, such a rocket had seemed more than large enough to carry a man that distance.

I left the Redstone and walked over to the fire extinguisher behind its shield. It was a cannon-type nozzle mounted on a post with a wheel crank driving a gear to raise and lower the angle of the nozzle. The whole mechanism had been painted a fire-engine red, but the rod

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connecting the crank wheel to the gear had been eaten away by salt air until it looked chewed and blackened and in one spot was no thicker than heavy wire. Ten years of history moved between me and the fire hose like an invisible, but heavy, curtain. Suddenly, the pad and rocket seemed ancient and primitive, almost quaint, like a Model T Ford on display at a present-day auto show.

The feeling of looking at things from a simpler, cruder time, stuck with me as we went on through the Space Museum. We passed a number of exhibits from World War II and later, guided missiles and rockets which had been frankly constructed as weapons. With two exceptions these were smaller than the Redstone. One exception was a 90-foot Thor-Delta. The other was an Atlas launch vehicle, like the one first fired from Cape Kennedy in November, 1958. The Atlas on display lay on its side; but it was a younger and larger launch vehicle than the Redstone, a 1½ stage rocket, with a 120-inch diameter. As a single first-stage, only, in conjunction with the 22-foot Agena B stage, an Atlas had helped launch the 447-pound Mariner 2 Venus probe on August 27, 1962. That had been a reaching out to a sister planet—space flight in the real sense of the word. And yet, even the Atlas I saw lying there was touched and seemed shrunken by the same cloak of past history that seemed to diminish my view of the Redstone.

The reason was not hard to dig out. I *knew*, even as I looked at these creatures of the Space Museum, that the Saturn vehicle I was about to see was so much larger than these exhibits that it would make them seem like toys . . . scaled-down playthings for the children of the present-day giant, whose actual massive tools were alive and fuming, only a few miles away.

We got back in the press bus and were driven over blacktop roads from the Patrick Air Force Base sections of the Kennedy area toward the NASA—National Aeronautics and Space Administration—section. On the way we passed an Atlas-Centaur in upright, ready-to-lift position on a launch pad; and the cloak of history began to dissolve a little. Above the 75-foot Atlas first-stage, the Centaur second-stage was 32 feet long, as opposed to the shorter Agena B. Also, between Centaur and Atlas, there was a 13-foot interstage adapter and separation system. This most powerful of the Atlas-combination carriers can put 2,300 pounds of probe into escape trajectory, or soft-land a payload of 700 pounds on the Moon. It is out of the class of playthings, even for giant children, and watching the Atlas-Centaur from a distance, as our bus rolled past it, I began to think I had bridged the gap in time and perception; and that I was ready now for the Apollo 14, with its Saturn stages.

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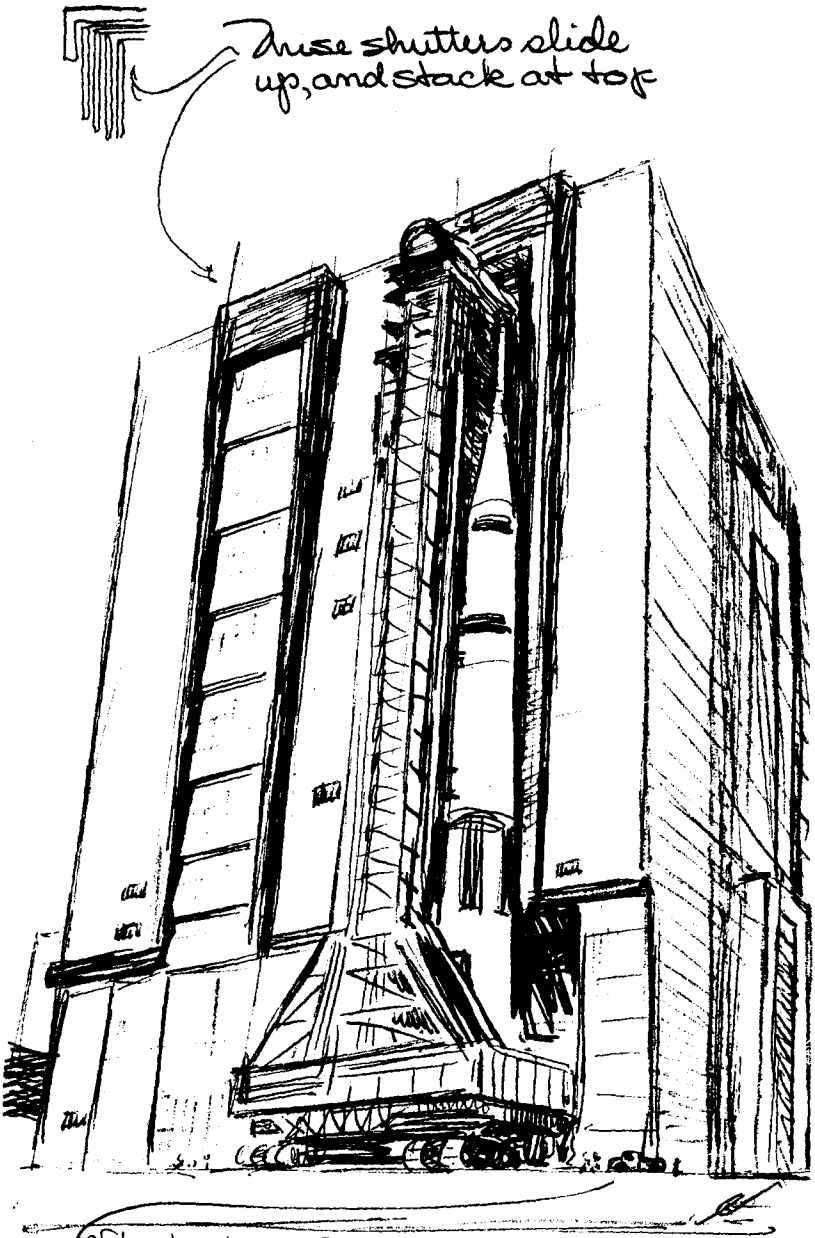

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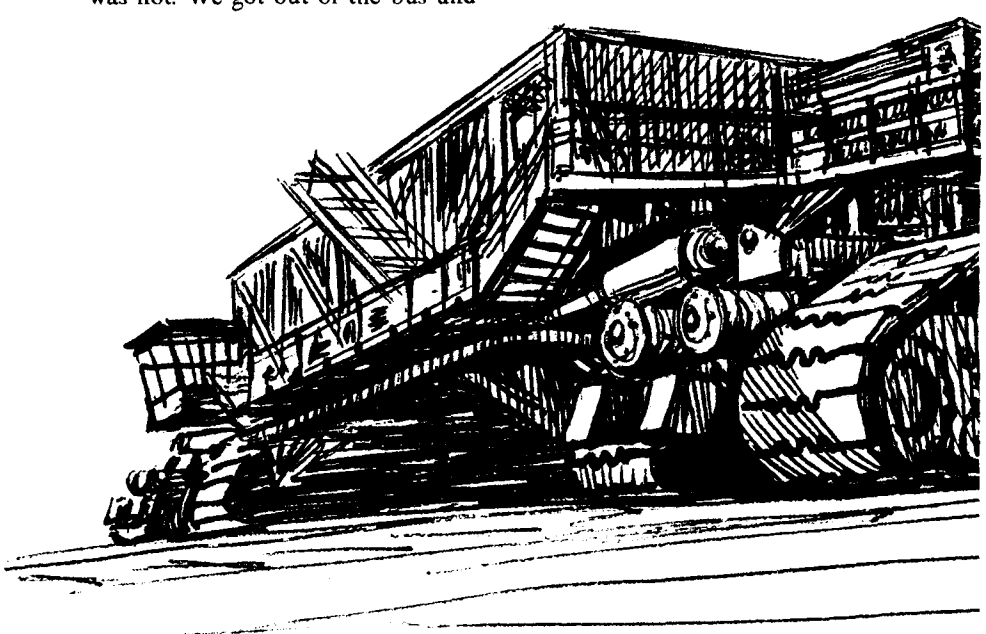
We passed from Patrick Air Force Base on to NASA ground and at the entry point to the later a uniformed guard with a side arm came on board the bus, looked up and down the aisle, then got off again without saying a word. The bus went on once more and turned in toward the wall of a big building—I had not been watching, for some reason, and the wall took me by surprise. We turned parallel to the wall, went on for a short distance and came to a high wire fence, a compound enclosing the crawler-carrier that carries the completed launch vehicle and spacecraft from the VAB to the launch pad.

I had thought I was prepared for the Saturn. It had not occurred to me to wonder if I was prepared for the size of the crawler—and I found I was not. We got out of the bus and walked around it; and it was impossible to see, for the same reason you cannot really see a block-square office building or department store. You could get different angles of view upon it; but there was no way to back off far enough to see it as a whole and still distinguish any details.

A baseball diamond on wheels would be a bit smaller. The platform is supported at each corner by what looked like an oversized army tank ten feet high and forty feet long. Its four great double tracks, each wearing 57 tons of tread shoe, are driven by 16 traction motors powered by four 1,000 kilowatt generators driven by two 2,750 h.p. diesel engines. Together, these moved the crawler's six



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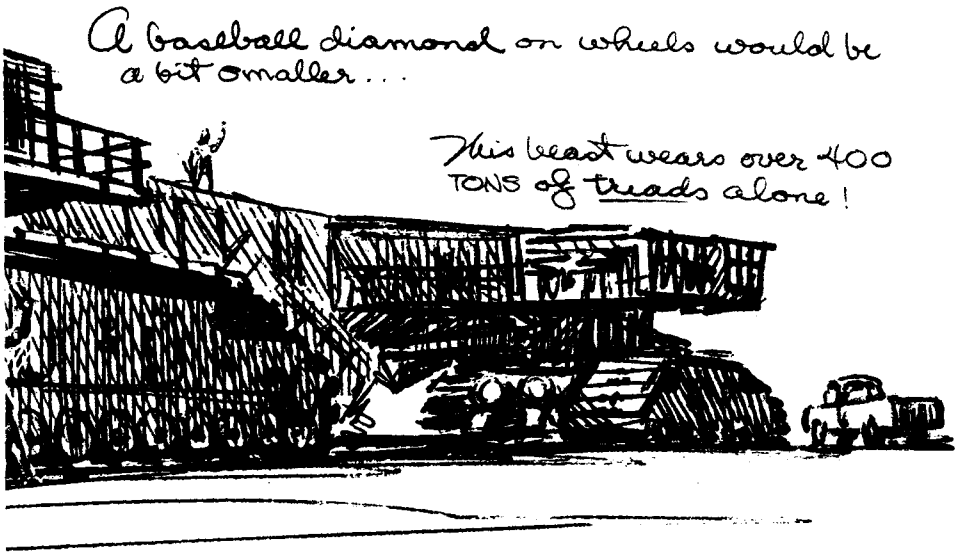
million pounds, plus its enormous cargo, once it was loaded.

To baby that cargo over the 18,000 feet from VAB to pad, it has a power system for the gigantic hydraulic jacks which keep the bird and its mobile launcher level. These are two 750 kw generators, driven by two 1,065 h.p. diesel engines, which also supply power for lighting and ventilating as well as steering—not that there is much steering except in actually positioning the load. You will notice in pictures that the crawler has an identical control cab at each identical end. All opening and control functions are coordinated in these cabs: one guides it going, the other returning. The machine never needs to turn around, although if it did I do not suppose anyone would ever know.

This is the largest tracked vehicle in the world, as far as is known. As such, it has generated a couple of tales.

Naturally, such a ponderous machine has to have a rather special road to carry the weight. The first tale is that the roadbed was put down originally with a layer of hydraulic fill, a thicker layer of graded lime rock and a final layer of special fill and surface sealer, all nicely compacted into a good, solid road twelve feet thick.

The crawler, the tale goes, roared out of its pen at top speed—one mile per hour—and sank five feet into the



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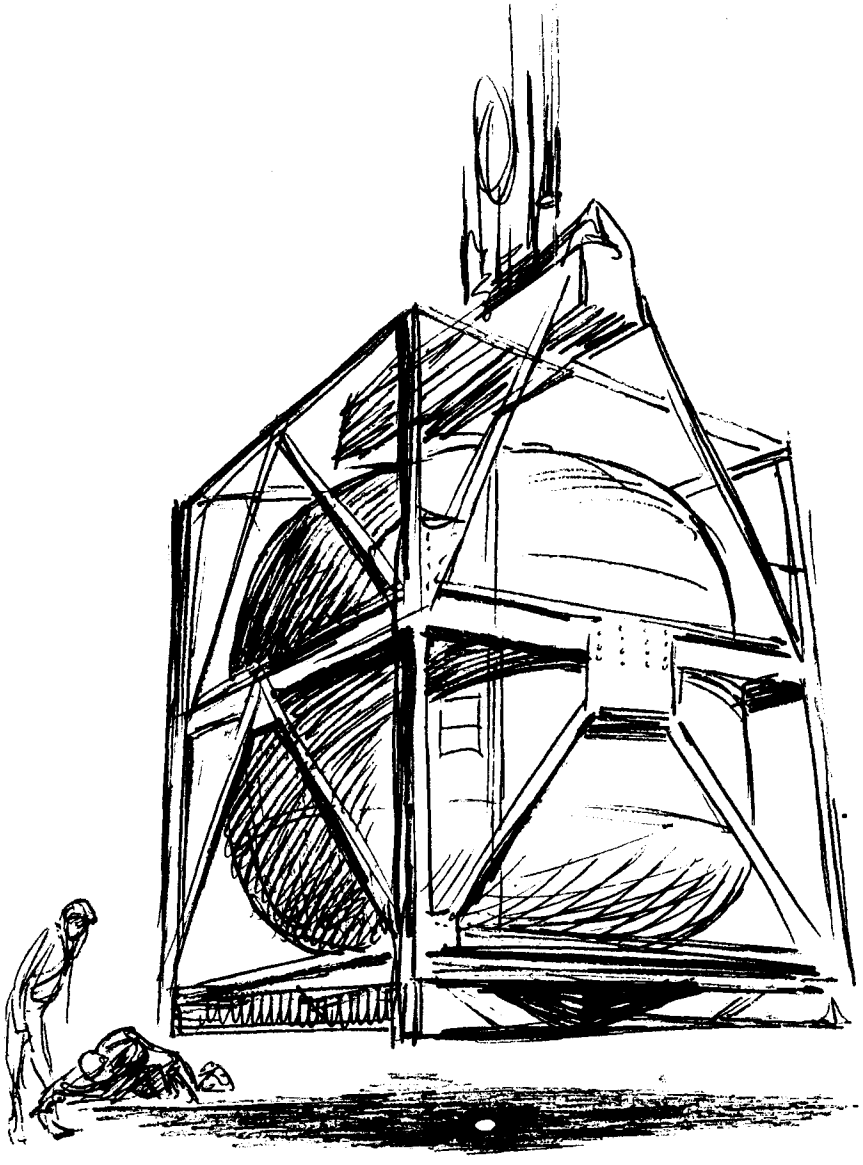

79.2 tons..
water filled

This weight is used to test the crane - and operator - for accuracy (the bird is fragile)
So is the egg.

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surface . . . Now it has a seven-foot thick roadbed.

Another tale has to do with the problem of wheel bearings tough enough to carry the weight of the Crawler/Transporter, let alone its cargo. It seems that when the original model was tried out the wheel bearings simply collapsed at the first revolution. One version has it that the bearings simply oozed out like toothpaste; the other version says the bearings were crushed and trickled out as a fine powder.

Whether the bearings crunched or squished, they *were* made of the toughest material available so there was no question of replacement, or substitution. The whole truck mechanism had to be redesigned and rebuilt.

The crawler carries a crew of eleven with three ground crewmen, and almost as an afterthought, it also provides power for the Mobile Launcher through two 1,250 kw generators. Two glass-windowed structures at corners diagonally opposite each other house controls that can drive it from either end. The control structures alone looked large enough to set up family housekeeping in.

After the cameras had stopped snapping, the bus drove on around the building and came on an entrance through which it looked as if several furniture vans could have been driven, side by side. We got out and walked through the entrance, from the eye-dazzling brilliance of the sunshine into a shadowy vastness beyond adequate description. This was the Vehicle Assembly Building; and we were inside it.

To come in on the ground floor of the VAB as we were doing was to realize literally the meaning in the old simile about feeling like an ant. Seen from the ceiling level of that 525-foot high building, a six-foot man could be no more visible than an ant in an ordinary room, if he could be distinguished at all. Standing on the floor and gazing ceilingward the eye went up, and up, and still up—until it did not seem possible to see farther. And yet still, it went up, to a darkness that must be the ceiling, but seemed no less untouchable and remote than the sky, itself.

Above us, a tenth of a mile of soaring emptiness. About us, eight acres of floor. Four of the Saturn vehicles with spacecraft atop each of them, could be constructed and contained in this building at once; and each 363-foot high Saturn craft was the equivalent of a 36-story office building in height and over 33 feet in diameter at the base. The VAB was a structure large enough to make its own weather out of the differences in temperature and humidity between ground level and ceiling.

Above, the eye lost its way in the maze of girders, platforms and catwalks. Looking up, it is not hard to believe that there are 100,000 tons of steel hanging overhead; but the sheer mass of it does not really strike home until your guide mentions that

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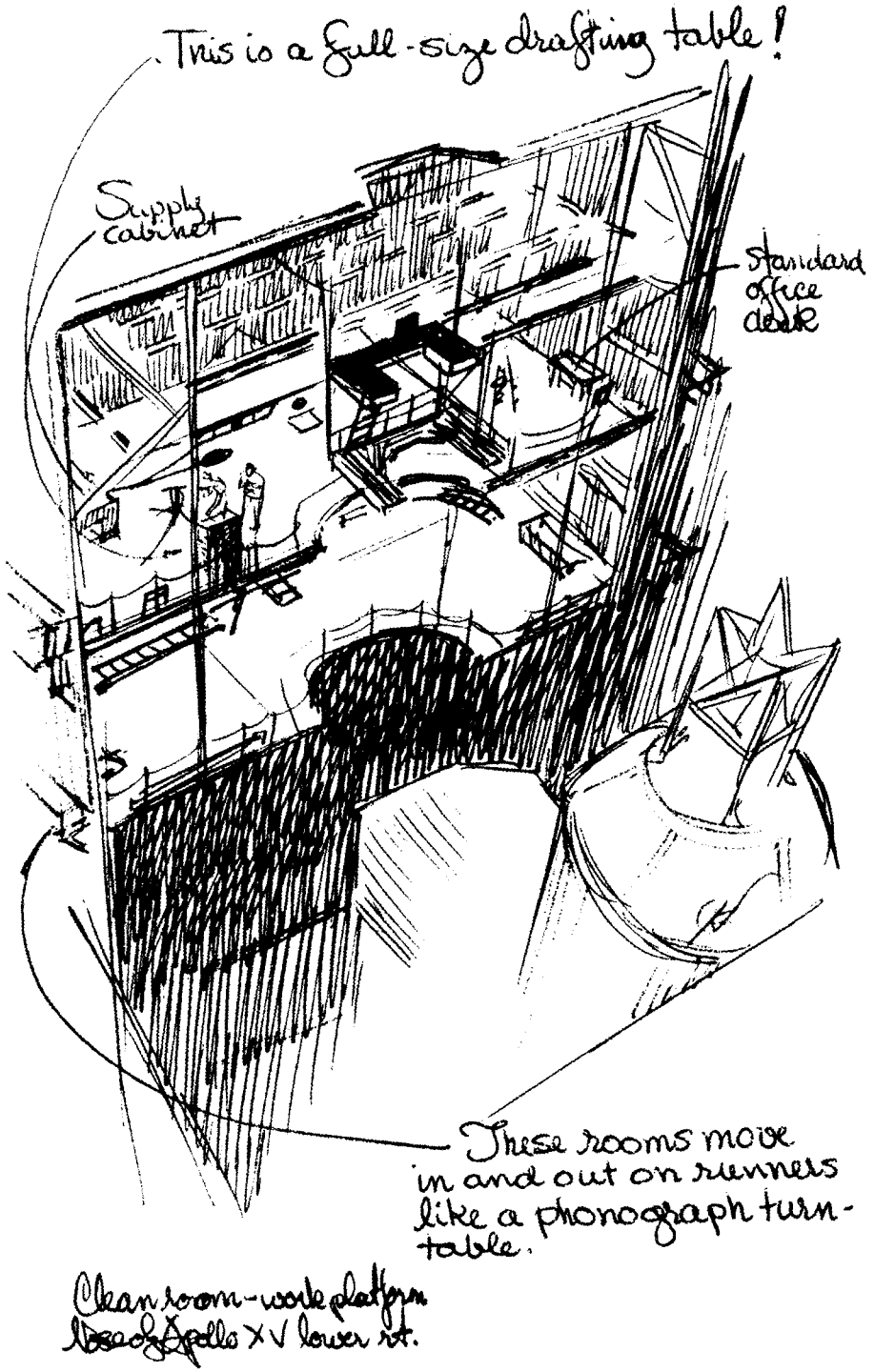
This is a full-size drafting table!
Supply cabinet
Standard office desk
These rooms move in and out on runners like a phonograph turn-table.

Clean room - work platform
Nose of Apollo X V lower rt.

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the building rests on pilings—16-inch steel pipes driven 160 feet into the ground—over 4,000 of them.

The great doors of the High Bay through which the launch vehicle is moved out to the pad allow about ten feet of clearance for bird and its umbilical tower, which stands 446 feet high. Their design allows them to open by sliding vertically, one section behind another, to the top of the building, 525 feet above the floor. Four doors—each 52 feet high, make up the launch vehicle's exitway.

It is through these massive doors that the huge, individual stages, brought in by barge, are placed into position, one on top of the other, as the rocket is assembled. The subsections that make up the completed bird must be aligned with perfect accuracy to produce the longitudinal rigidity necessary to carry the thrust of the engines. The result resembles a tower built of children's blocks—in this case, round tubes—which carry their 400 feet of height on a 30-foot base and have no horizontal strength at all, relatively speaking. The least deviation from perfect alignment, and the bird would snap like a fresh breadstick.

The incredible care with which the rockets must be handled is pointed up by the maneuverability of the great 250-ton bridge cranes used to stack the elements of the vehicle. One of the tests for accurate manipulation of these cranes consists of placing a drop of oil on the floor below the test load. The latter is a water tank which weighs about 70 tons filled. The tank is lowered until it touches the oil—but not the floor. Or it may be lowered to touch an egg without breaking the shell.

The confidence VAB personnel have in both the precision of their cranes and the skill of their operators is indicated by the carefree abandon with which a mechanic will plunge an irreplaceable arm into the space between a dangling load and a steel girder, to fasten a clamp or remove a nut. This is part of the feeling of a different place with different rules that permeates the VAB. Appearance and reality confound each other, here.

Moving through the VAB, I was continually surprised by the contrast between the appearance of lightness and delicacy which each area presented from a distance, and the no-nonsense solidity of steel and concrete close up. Gradually I began to realize that the designers had literally used full-sized rooms like Belgian Blocks, building walls and partitions of them to enclose the great bays in which the vehicles are assembled. Inside these walls are offices, shops, ready rooms, storerooms and even snack bars. Looking from above down on the nose of the Apollo 15 itself from the upper levels, the eye is stretched, baffled and finally lost in the descending dimensions of girth and distance. What stood there as I looked down was something too big to be imagined in any other way than as a fixed struc-

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ture. The thought that it could someday lift by itself from the Earth was unbelievable.

Far below, on the floor itself, the wide door by which we had entered, now looked no larger than a mousehole. But, later when we went back down and out of it again, it was as wide as ever. Only, the world beyond it was not now so much a larger, as a merely different place, where the sky seemed hardly any farther away than the ceiling of the VAB had looked to be, inside.

We got back in the bus and drove on toward the launch pad where the Apollo 15 was already standing. I was still numb from the VAB, and did not notice anything outside the bus until I saw heads craning out the windows to our left. I turned then and saw the crawlerway along which the crawler transports the vehicle and its mobile launcher to the launch pad. It was as it had been described to me, looking very much like a superhighway 130 feet wide; two roadway-broad strips with a wide green space of turf in-between them, paralleling the blacktop road we were on. It was along this that the Apollo vehicles moved, exerting surface pressures of 8 to 12 thousand pounds per square foot, as the 17 million pounds of combined load of crawler and vehicle moved ponderously over them toward the launch pad.

At the end of its trip, not only would the crawler carry its load along the level crawlerway, but it would need to mount the 5 percent angle of the ramp sloping upward to the launch pad, carefully tilting its own bearing surface so that the 36-story vehicle it carried would remain upright at all times, like a bottle on a tray in the hands of a skilled waiter. It must keep the top of the bird vertical within 10 minutes of arc, plus or minus. That gives it a margin of error roughly the diameter of a basketball . . .

The Launch Pad and Mobile Service Structure almost deserve an article to themselves; for now with the bird in place, it is at this point that the whole effort comes together; and both pad and structure are of a piece with the rest of this Brobdingnagian wonderland.

For some reason it had not occurred to me how important it would be to exercise some control over the blast of flame from the rocket engines. This control is provided by a miniature Grand Canyon 450 feet long, 58 feet wide, and 42 feet deep, called the Flame Trench. A 700-ton flame deflector at its middle sends the exhaust gases roaring out to each side, producing the familiar sunrise effect, lighting the whole horizon. Most of the billowing clouds visible in pictures of the launch are steam, for the cooling system which washes the pad down after a shot is capable of pumping 45,000 gallons of water per minute.

The pad has a number of interesting safety features in case of

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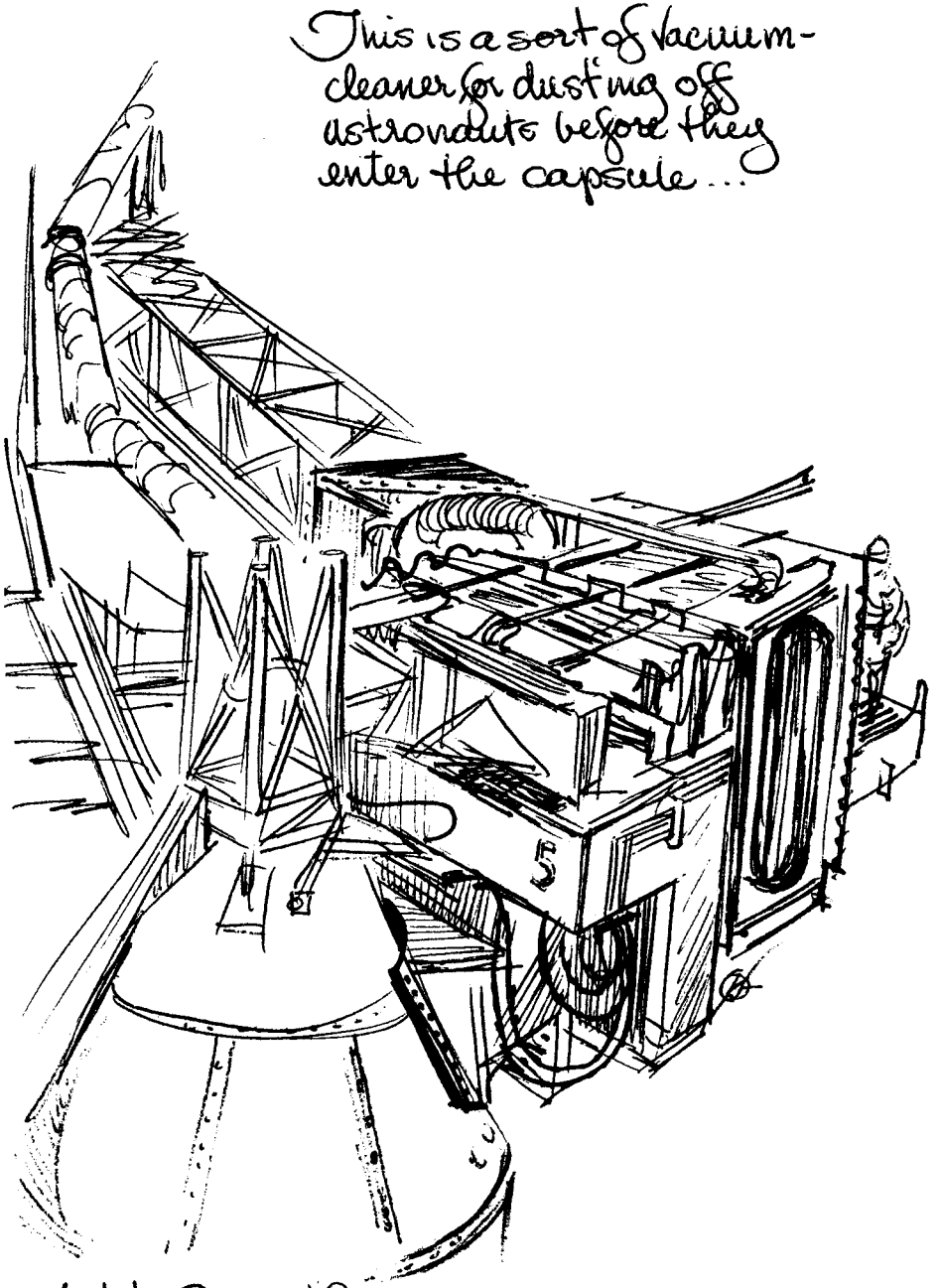
This is a sort of vacuum-cleaner for dusting off astronauts before they enter the capsule...
'White Room - this one is really clean

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trouble. One is a blast resistant room, 40 feet underground, with seats, safety harnesses and survival gear for 20 men over a period of 24 hours. It is designed to cut a 75 gravity blast force to 4 G's, and is reached by a 200-foot escape tube from the launch platform.

The bus returned us to the Press Headquarters in Cocoa Beach; and the science-fiction people gathered at the home of Joe Green, NASA engineering writer and one of our sf writers. That night, after dark, Joe drove a number of us out on the causeway to look across 17 and ½ miles of open water at the Apollo 14, now free of its scaffolding and spotlighted. Amazingly, even at that distance, the Saturn and its spacecraft were large enough to stand clearly visible.

We were not alone in the watching. All that day, the cars had been flooding into the Cape Kennedy area, and now the causeway was parked thickly with them on both sides—people who had come to spend the night to watch the lift-off tomorrow, even from twenty miles or so, at an expected launch time of mid-afternoon on the next day.

". . . *The public,*" my news editor had said, "*has had this Moonlight business . . .*"

But it did not look so, there, at 10 p.m. on the dark causeway with the cars crammed together along its length and the Apollo 14 shining under its spotlights, seventeen and a half miles away.

The next day, with four hours yet to lift-off I was in the press stands, talking to Kelly Freas about the deceptive size of the VAB, seen from where we sat.

The press stands are the closest viewing area of any to the bird—theoretically just within the danger area at three and a half miles of distance from the launch pad. Free of everything now but the upright tower of the Mobile Launcher, the waiting Saturn vehicle breathed light plumes of excess vapors into the sunlight. Its size made it seem closer than it was, like a tower on the landscape.

Ahead of the stands was a large digital clock on a little apron of ground, reaching out perhaps a hundred and fifty yards to the edge of a patch of water, beyond which was flat Florida scrub brush for the rest of the three and a half miles to the rocket. To right and left of the bird, but some distance from it, gleamed the white-painted globular tanks that were pumping fuels into the rocket engines.

In and about the stand itself, the atmosphere was one of busy boredom. The movie and television cameras were set up in a line before the stand and occasionally a loudspeaker would advise us of some small detail. Otherwise we merely sat around talking and waiting. There was a burst of Spanish in a female voice, two rows down and behind me. I turned and saw a small, pretty, dark-haired girl standing talking to two

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men, as if she were at a cocktail party rather than a space-flight launch.

But I could not blame my fellow reporters and photographers. The buses had brought us all here early, and for four hours we had had nothing to do but to sit and wait. Still, the digital clock out in front of the stands, halfway to the water's edge, was continuing to click off the minutes and seconds. Then there was a hold—a slight delay. It seemed that rain clouds had moved in. In fact, we could see them. We waited, and after a while a couple of light planes could be seen circling the edge of the darkness over us. A few drops of moisture fell.

Then the hold was lifted. The countdown went on. It was close now, less than three minutes to liftoff; and a little stir went through the stands. I found I had stood up, and around me others were standing up, also. Gradually we began to leave the stands for the ground in front of it, walking forward toward the water's edge and the rocket, which stood towering there in its more than 6 million pounds of immobility.

The countdown had less than a minute to go. A sudden squall of rain swept down on us; and there was no shelter. We, who were in the front, ran ahead to the digital clock facing the stand and tried to find some protection there, but there was none. Around me shirts were turning dark with the wet. My own shirt was sticking to me. I looked back toward the stands, expecting to see most of those who had come out streaming back to the shelter of its roof—but practically no one was turning back and the stands were almost empty.

There was no point in pretending to hide from rain against an upright wall. I gave up, and walked around the clock, on to the water's edge. Already, there was a line of people all along it. I found a spot, wiped the lenses of the binoculars hung around my neck and looked.

The umbilicals had fallen away from the bird. The rain was lightening a little, but still it fell on us. The cloud was still dark overhead. Without warning, orange flame spurted to right and left from beneath the rocket. The length of the flames was incredible. They looked as long as the rocket was tall and there was not a sound to be heard. The Apollo stood there, a huge, immovable structure conducting a fireworks display at its base.

Then the sound came—the first, sharp cracking explosions, building to an impossible volume. And the whole thing began to move. It lifted—it actually lifted those hundreds of feet of length, those millions of pounds, upward and upward, the flames growing shorter and showing brilliantly white at its base. The sound rolled over us, buffeting our minds.

It rose. The clouds were still close overhead. The nose went into the clouds while the tail seemed still to hover only a short distance above the

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landscape—and everybody was talking. I was talking.

"My God!" I was saying. "My God . . ." It was not just an immovable tower after all. It was alive. It was going—heading out beyond everything. And it was taking three men with it, three men who were already hidden in the clouds.

Roaring, it slipped upward, the whole bird, as if with brute strength it was pushing Earth away from beneath it. It went away from us, up into the clouds; and there was no one there who was not saying something.

"*Mira! Mira!*" The sound of the small, high voice made me turn to look; and I saw her again, the little, dark-haired girl, pointing and exclaiming in Spanish. "Look! Look—"

It was gone then, all but the sound. For a few seconds more, everybody continued to stand there, talking, and then we turned; and the return to the stands became a scramble for the shelter of the buses parked beyond.

But, running with my head down for the bus through what rain that still fell, I had my answer to the puzzle of the size of the VAB, seen from the outside, and the attitude of the news editor, all at once. Kelly was right; it was a matter of perspective. The VAB was too big. If you were close enough to measure it against anything else, you were too close to see it as a whole. If you were far enough back to see it whole, it was too big for any of the things standing about it to serve as measures for comparison. Faced with these choices, the eye gave up and refused to believe it was as big as it was.

So, with the space effort as a whole, and the Moon flights in particular. The press was close enough to make all the measurements and report them—but because of that fact, often too close to see exploration of space . . . as a whole. And the public to whom the press reported was too far from that exploration to make measurements of its true value. The public only saw the mass of the effort as a whole from a distance, and its remote gaze refused to believe that anything could be so big, so mind- and soul-shaking.

But there was no split between the engineers and the poets, after all, no matter what else might appear. Because there was a point at which the work of both came together; and that point was the moment of lift-off in which we in the press stands, who knew all about it and were here as part of our working day, ran forward instinctively to stand in the rain and watch something man had built with his hands leave Earth for space. In that particular moment we betrayed the fact that we were all together part of that vehicle, and one with the three men riding it spaceward. We gave it away by our actions and our voices.

". . . *Mira! Mira!* . . . Look! Look!"

—And indeed, look! To the stars. ■

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The Incompetent

Now you may not believe this—so . . . So have fun with it!
by CHRIS BUTLER

KELLY FREAS

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The staging lights in the tube began their muted sequencing, color by color, changing quickly from warning red to good-bye green—much too quickly, it seemed to Carsdale. This whole thing was happening too quickly, he wanted time to think, but the ejection tube was already aligning itself, compensating for the FR-127's speed and altitude.

The green light flashed on, once, twice, three times. Carsdale closed his eyes tightly, aware that even his eyelids were trembling and then the tube hatch snapped open and he was sucked outside by the vortex of air currents. He didn't feel much like a super weapon just then . . .

On every radar screen within 1500 kilometers, the bright low level blip that was the FR-127 suddenly jettisoned several tons of mass and abruptly began a forty-five degree climb, accelerating through four mach numbers before toss-bombing a missile toward the factories of the southern Urals. Just before the Balkan laser installations obliterated both blips, the 127 beamed a tight-band compressed maser message toward the Allied synchronous station some 24,000 miles overhead. This was intercepted and upon decoding turned out to be the first hundred and twelve pages of Volume VI of the current *Encyclopedia Britannica.*

For all intents and purposes then it seemed to have been an unmanned test of Soviet defenses in the Mediterranean, assuming the jettisoned mass was only fuel. Pending investigation of that, the effort could be considered a professional courtesy call, a measure designed to keep an enemy on its toes.

As if there were any need of that. The stalemated war ground on, both antagonists waiting for the next feint.

Several hundred feet under downtown Omaha, General Gary Peters sat before a dimming radar screen, sipping bourbon and water. So Carsdale was on his way—so big deal. The whole idea was preposterous, idiotic, the sort of operation that came from turning warfare over to nonprofessionals—to amateurs. Peters climbed to his feet and waited for his aide to hand him his cap and staff. War was becoming absurd.

The blast of subsonic wind hit Carsdale and spun him, hard. He knew that the drogue popped and stabilized him less than five seconds after ejection, but they hadn't told him how bad those five seconds could be. It felt like his head was being torn off!

The sound of the drogue opening gave him courage; he opened his eyes and saw the ground rushing up at him, accelerating at him, reaching out to smash him. My God, the main chute hadn't deployed, he was going to be killed! Frantically his hands fumbled for the manual release, found the D-ring, yanked on it. It

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was the wrong D-ring. Part of his quick release harness began to pull loose.

Mercifully then, and right on schedule, the timer automatically flung out the spring-loaded main chute. Carsdale had to use all his strength to hold his harness together when the chute deployed but now, just hundreds of feet off the ground, he could see that he was drifting down toward the clearing, right on the money.

Moments later he slammed into the ground and twisted his ankle, trying a trooper's roll in the wrong direction. Bruised, dazed, and in pain, Carsdale pulled in the lines and collapsed the chute. Despite the agony he managed to bury the fabric and crawl into the dark Balkan forests before taking a pain suppressant. As the drug took hold he climbed into his sleeping bag and settled down for a few hours, hoping his foot would be tractable when he woke. He was going to need it.

"Where is he now, Lockwood?" General Peters snapped at his aide. "Hasn't that idiot reported in yet?"

Captain Lockwood spoke softly into the intercom and after a homent flipped it off. "No word yet, sir. Nothing since he landed, sir," the aide mumbled reluctantly. "Eurcom suspects a damaged communicator."

Peters jumped to his feet. "Now how the hell can anybody break a C-IV communicator. It can't be done, Lockwood! Damnit, those rigs are shock-tested to 200 Gs! You could run over one with a Breznev tank and not faze it, right?"

"Yes, sir, that's correct, sir. Lab admits they don't understand it . . ." Lockwood quietly poured the general another drink, a double this time, hoping it would calm the old man down.

It was raining when Carsdale awoke, a light drizzling rain that soaked everything he was wearing. Somehow the water had even managed to get inside the waterproof pouches of the sleeping bag. His dehydrated food parcels had begun to swell and spoil; some of the soup-concentrate had seeped in with his only set of Croatian peasant clothes. For a moment Carsdale lay still, feeling the rain spatter on his face and then he scrambled out, thoroughly disgusted. This was going to make a fine first report to Eurcom.

Reaching into his bag, he fumbled for the equipment pouch. It wasn't there! In a panic Carsdale ripped open the bag, scattering the contents. His ankle chose that moment to buckle and he went down painfully, slopping into the cold mud. Had he been one to despair, it would have been an appropriate time. But Carsdale was made of sterner stuff.

He made a support bandage out of the ruined peasant clothing and strapped on his stylish pistol anklet extra tight. Forcing himself to think calmly, he realized that the equipment pouch must have come loose

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when he tried the chute's manual release. That was bad, very bad—it meant loss of his special electronics gear, loss of his native currency and above all it meant the loss of his C-IV communicator. Now he was really on his own.

Looking up into the dismal rain, Carsdale took a deep breath. So be it. He shouldered the wet remains of his equipage and headed through the forest, looking for a highway North.

CARSDALE, ABBOT MARTIN.
Born: March 8, 1973
Present Age: 34
Height: 5'9"
Weight: 147 lbs.
Distinguishing Features: Freckles, blue eyes . . .

For the tenth time General Peters thumbed through the dossier on Carsdale, trying to understand why the Psych-Tech boys had picked him for this mission, and why this mission was being run at all. It didn't make sense! Now maybe he wasn't a psychologist and maybe he couldn't understand all the fancy terminology in the dossier but one thing was clear, even to an old war horse like himself. Carsdale was a bumbling idiot.

Not stupid; certainly Carsdale was intelligent, educated, capable in four languages, a competent mathematician and even a fair musician. He was loyal, had passed the C.I.A. course with flying colors and had audacity. But he was still a bumbling idiot. His dossier was full of incidents that Carsdale had bollixed, inexplicable incidents that negated all his talents.

In the fourteenth grade, as head of his class in differential calculus, Carsdale had been recruited as student aide to his high-school's programming department. Three days later he stumbled at the wrong time and the entire file on the graduating class of 1987 was erased. In an attempt to rectify the situation Carsdale had called upon his considerable knowledge of computer circuitry and attempted to fix the machine.

Three company technicians brought in a quarter ton of equipment to repair the damage but were unable to find the source of the trouble. Carsdale had badgered them with questions and advice until in a fit of exasperation one of them had picked him up bodily and had thrown him out of the room. The impact of Carsdale bouncing off the wall across the hall apparently jolted an intermittent solder break into proper position because the computer immediately resumed normal operation.

What a man to have on your side! And the dossier was packed with similar incidents, some even stranger. General Peters snarled and threw the dossier across the room. It made a satisfying *thunk* as it hit the wall and its hundred pages scattered about. Then the general flicked on his intercom and barked, "Lockwood, get in here and clean up this mess!"

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Standing on the left side of the highway in his gray seersucker suit, Carsdale tried to fabricate an excuse for being so wet and for carrying a sleeping bag. As an ancient turbine truck pulled over for him, he decided to try explaining as little as possible.

The driver looked at him strangely for a moment, then pulled back onto the highway and muttered in broken Russian, "You've got to be a Russian, right?"

Carsdale grinned and nodded.

"Figures. Lately all the weirdos I pick up are Russians."

"Perhaps I should explain—" Carsdale began in Ukrainian.

The driver just laughed and shook his head. "I don't want to know, buddy. I mean, if you're Russian then it has to have something to do with the war. It just has to, you people never come down here for anything else, right?"

Carsdale stopped smiling. "How do you know that?"

"Just always works out that way. You're a spy, right?"

Carsdale reached slowly for the 12mm pistol in his anklet on the pretext of scratching his foot. "What makes you ask that?"

Again the driver laughed. "Comrade, I average three spies a trip on this run. The country's just crawling with them. Americans, Chinese, Russians—" Glancing over at Carsdale, he added, "On a bet I'd say you're really an American, and you got wet coming in off a submarine, right?"

"It's been raining," Carsdale said cautiously, fingering his weapon.

Grinning broadly, the driver said, "Yeah, yeah, I know. Don't tell me, what do I care? Me, I like trucking just fine. You boys go ahead and run your war. I wish you luck, I really do. Besides," he added with a wink, "it's good for business. Know what I mean?"

Carsdale grinned weakly and left the pistol where it was. The first Eurasian he'd ever encountered, a dumb truck driver yet, and already his cover was destroyed. He sighed and sat back in the seat, listening as the driver rattled on about himself.

A thousand kilometers to the north the truck pulled over and Carsdale climbed out, confused. According to the driver, life under the Communists was sweet. It seemed that the war took up most of the Russians' time, leaving the lesser powers to provide economic support. That meant jobs for everybody and health services and even local self-government, since running a world war and governing twenty-two other countries was beyond the Russians' resources. Technology was booming, pollution was being halted in an effort to increase production and birth control was becoming feasible with the threat of instant annihilation hanging over everyone's head.

Carsdale was skeptical because it didn't quite agree with what the C.I.A. boys had told him, but he politely refrained from saying so. One thing he did ask. "Say, uhh,

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Comrade—" he began, stepping down from the truck and scratching his foot again. "If I were by some strange chance an American spy, how do I know that you won't go to the authorities and report me as soon as you drive off?" Carsdale attempted to cock the pistol through his pants leg.

The driver just laughed. "Hey, who pays any attention to spies, huh? Who cares, they're everywhere! So have yourself a good war buddy. And get yourself something to eat," he added, handing Carsdale a twenty ruble note.

"Thanks," Carsdale mumbled as the truck drove off. He barely remembered to uncock the pistol before walking to a restaurant.

Sitting in an aluminum tub with the agitator turned to high, Peters pondered his war. Almost automatically he rolled an unlit cigar around in his mouth, thinking. His dress cap still perched on his head and would until he had to wash his hair; it helped to remind him of who he was, in the midst of all this.

Twenty years the Third World War had lasted now—twenty strange years. Peters remembered how excited he'd been in '87 when the disarmament talks at Potsdam had broken up with the Allied and Soviet ministers handing each other formal declarations of war. The world had been stunned—the war it had been dreading for forty years was then a reality. For a world it implied a new era, full of greater fear and destruction than any other era in history, but to a young captain in the U.S. Army it signified the beginning of great happenings, of promotions and glory and finally getting something done! Those were the days.

Somewhere along the line it had all soured, though. The war had cost nearly five trillion dollars so far and things weren't getting any cheaper. Total casualties for twenty years of fighting—nobody knew for sure. The figure must have run into the dozens, though, Peters thought sarcastically. Why, every week somebody fell off a gantry and died in the defense of his country. And the war dragged on.

But now Peters had a chance to change all that. Through daring and imagination he had made known his willingness to fight his country's battles and carry her banner. He'd risen as high as a career officer could and still his patriotic fervor for the good fight hadn't waned, not a bit! At last, as Chief of Allied Offensives, it was his personal responsibility to bring this action to a speedy and victorious conclusion. His responsibility, his alone . . .

Peters gazed beyond the porcelain and linoleum of the Staff Bath, seeing visions known only to himself.

Carsdale sat in the darkest corner of the small roadside restaurant, looking at no one, his confidence shaken by the ride. After a moment a girl came to take his order and he

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asked for borscht, black bread with smyetana and a glass of vodka, using his thickest Ukrainian accent. The girl nodded and walked away, smiling. Carsdale saw her give the order to the chef and whisper something in his ear. Both of them glanced at him and then hurriedly looked away, suppressing their laughter.

It was disconcerting, to say the least. He tried to sit lower in his chair, to be less noticeable, wondering how this could be happening to him. He'd had three years of intensive training at the C.I.A. Institute, could handle Russian dialects like a native and was a highly competent actor when he needed to be. Besides which he was a super weapon, so how was all this possible?

A little boy brought over his food. Carsdale smiled at the youngster and tried to pat him on the head, but the kid giggled and jumped back excitedly. For a second they stared at each other and then the boy ran back behind the counter, leaving Carsdale to his dinner. Good lord, even kids knew—

Well into his third glass of vodka, Carsdale began contemplating his status as a super weapon. It was a moment of self-doubt, of wondering what the C.I.A. had seen in him to think him a superior human being and a specially-equipped warrior. Without being egotistical he realized that he was a truly gifted individual, highly intelligent, talented, clever, diversely trained, even good looking if you could accept the fact that a thin body was functionally superior to a heavy one. So he was many notches above the common man; even so, did that make him a super weapon?

As the Intelligence people had explained it, he was better off not knowing the nature of his peculiar talent. That way he would be more capable of using it naturally and, in the unlikely event he was captured, he would be unable to pass on top secret information to his interrogators. That made sense, in a strange way.

Still, he couldn't help wishing they'd been more specific in his assignment, instead of just telling him to work his way north, infiltrate the Russian defense operation and let nature take her course. Apparently they were certain he'd be able to cope with any situation that arose, to send him in with so little instruction. They had a lot of confidence in him and in his quick wittedness, and rightly so, Carsdale realized. He wouldn't fail them—

The kid tugged on his sleeve just then and presented him with a bill. Carsdale snapped out of his reverie and reached into his pocket for money.

"Gospodeen, gospodeen," the kid said in a shrill voice, giggling.

"Da, malcheek?" Carsdale responded cheerfully.

"Gospodeen, ou vass yest microfeelm?" the boy asked with an excited smile.

Carsdale slammed the twenty

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ruble note on the table and stalked past the kid, muttering, "Drop dead, brat." It wasn't until he was ouside that he realized he'd spoken in English.

"General, we have news on the Carsdale mission," Lockwood said as he brought dinner on a tray into the general's bedroom. Peters put down his book and looked up, mildly interested.

"Oh, really? Has he been captured, tried and shot yet?" he asked as he picked up the glass of bourbon.

Captain Lockwood held back a smile. "No, sir, not quite. He seems to have worked his way to the southern Urals, according to Intelligence. One of our boys spotted him a short while ago, hitchhiking in the vicinity this morning."

Peters raised his eyebrows. "You're kidding, Lockwood. You mean to tell me he's got that far and the Ruskies haven't spotted him yet?"

"Not exactly, sir. We're pretty sure the Poles, Yugoslavs, Hungarians and Russians know he's there as a spy, and we suspect the Chinese will know shortly."

The general gagged on his bourbon and snorted to clear his nose. "So why in thunderation don't they pick him up and execute him? All this suspense isn't helping my ulcer a bit, damnit!"

"They will, sir, after they've watched him for a while. That is, they'll pick him up."

"And execute him?" Peters asked hopefully.

"Possibly, but I doubt it, sir."

"Why not? He's a spy, it's a war, they're perfectly within their rights . . ."

"Yes, sir, I know," Lockwood interrupted. "But this is a strange war, sir. Perhaps I should explain the role of a spy—" The general put down his drink and sat up.

"Yes, please do, Captain." Peters was beginning to feel confused.

Stepping out of the pneumatic subway, Carsdale smiled to himself. In spite of all odds and even though a hundred people had guessed he was a spy, he'd made it to his objective. He'd survived a full week among conquered peoples, in the midst of a war, having only his native cunning and wit to rely upon. It was a good feeling.

Stepping into the sunlight, he squinted and hailed a black and red cab. "To the Bolshevik Peoples' Propulsion Plant," he ordered in flawless Russian.

The cab driver nodded and pulled out into the traffic. "Very good, sir," he answered in Russian. "And welcome to the Soviet Peoples' Republic, Mr. Carsdale."

With one fluid motion Carsdale reached down, grabbed his pistol and held it to the cabbie's ear. The driver just clucked his tongue disapprovingly. Something in the tone of the clucking told Carsdale that blowing the driver's brains out at

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that time wasn't a good idea. Not knowing why, he sighed and handed over his pistol.

"You see, General, war is a good thing, a very good thing for a country, provided of course that country doesn't lose or get invaded."

Peters nodded. Yes, of course, that was basic. "Get on with it, Lockwood," he ordered.

Captain Lockwood coughed self-consciously and continued. "Well, sir, now that the art of warfare is so advanced, both sides have achieved a state of technological equality. Anything they can throw at us we can throw back at them, and we can knock down anything they throw. It's a stalemate, a complete standoff, but it has a good side. It's stimulating the hell out of our economies, sir."

"Yes, yes, of course, I realize all that," the general muttered irritably. Then he leaned forward and stared his aide squarely in the face. "But I realize something else, too, Lockwood. Those Ruskies would murder us in our sleep if we gave them half a chance."

"Quite possibly they would, sir, if the opportunity ever arose. But that could happen only if one side grew lax in its defense, or if one side developed a new weapon that the other side couldn't counter."

"Lockwood, I'm a general, I know all of this. Quit lecturing me and tell me what all this has to do with spies. And how the hell is an idiot like Carsdale important?" Peters picked up his bourbon and sipped angrily. Who did Lockwood think he was, anyway?

"I'm getting to that, sir." Lockwood responded. He sighed and continued. "Spying is what holds it all together, sir. There are so many spies involved in this war that you just wouldn't believe me if I told you—"

"Cut the dramatics, Lockwood."

Lockwood stiffened. "Yes, sir. Sir, there are nearly half a million Russian spies in the United States alone, and at least that many Americans in Russia. Sir, we don't even know where all ours are, much less theirs, General!"

Peters set down his glass of bourbon, spilling some of it. "A half million?" he asked weakly.

"Yes, sir. Five hundred thousand, sir. And that's why the war goes on, sir. There are no secret weapons because there just aren't any secrets anymore."

Numbly the general reached for his cigar and his drink. Lockwood hurried over to freshen the bourbon, then continued his explanation.

"The Carsdale mission was dreamed up by the Psych-Tech boys, as an experiment, sir. You see, since the Russians know every action we plan against them, we had to throw at them something we didn't quite understand ourselves. Like playing intuitive chess—"

"Chess," Peters mumbled. "Chess. What has Carsdale got to do with chess, Captain? The man is a bumbling idiot, Lockwood! He's never done the right

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thing in his whole life!"

"Yes, sir," Lockwood smiled. "That's precisely it." General Peters groaned audibly.

Two guards met the cab at the plant and saluted politely; Carsdale started to salute back but stopped himself. This was war. The cab driver wished him a pleasant stay and drove off, whistling a song from "Oklahoma." If Carsdale had had his pistol just then, he would have pointed it between his vacuous eyes and ended this insanity. As things were, the guards led him gently to an elevator and they began dropping hundreds of feet into the ground.

A jovial fat gentleman greeted him when the doors finally opened.

"Welcome, Mr. Carsdale, and congratulations on reaching your objective. You are presently standing in the People's Black Sea Operations Room. You've made it, Gospodeen Carsdale!"

Carsdale returned the handshake feebly. "Do I get shot now or later?"

His host smiled amiably. "Ahh, you have a sense of humor. That's good, that's very good. Ha ha."

Ha ha. Carsdale looked around the operations room numbly. It was huge, nearly the size of a football field and there were hundreds of uniformed Russians working here, each undoubtedly intent upon the total destruction of the United States and what she stood for. He felt helpless, disgustingly helpless.

"Ahh, Mr. Carsdale, allow me to introduce myself. I am Alexandreii Dubroff, in charge of this center's Psychological Warfare department. But call me Alexii," he said and clapped Carsdale affectionately on the shoulder. Arm in arm they walked through the maze of machinery toward a small, isolated console. One man sat at that console and from the amount of chrome on his uniform Carsdale could tell that this was a man to be reckoned with. As they approached, the officer looked up disinterestedly.

"Marshal Yanoff, I would like to present Mr. Abbot Martin Carsdale, American super weapon and a nice fellow, too, I might add." The marshal seemed unimpressed. "Mr. Carsdale, this is Marshall Mikhail Sergeeivitch Yanoff, defense director for the entire People's Central Republic. We've been waiting for you."

It was too much for him, Carsdale had to do something, anything! He couldn't be so close to the seat of Soviet power and do nothing! Desperately he reached inside his pocket and pretended to finger a mechanism. "All right, nobody move! I've got a bomb in my pocket!"

Alexeii smiled encouragingly. "You see, Marshal, he is very quick witted. And a sense of humor, too, I might add." Marshal Yanoff took a sip of tea, frowning.

"Everybody up against the wall, feet apart, hands over head. Now, move!" Carsdale ordered menacingly.

"Please, Mr. Carsdale, you don't

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have a bomb. You lost your bomb when you parachuted into our country, yes?"

Now how did they know that? "Uh-h-h, yeah, but I got another one from a revolutionary I met—"

"No, Mr. Carsdale, you didn't. We have no revolutionaries anymore and besides, nobody gets by the alarms with weapons. There are metal detectors, you see."

"Yeah, well, this is plastic and it's about to go off!"

"Mr. Carsdale," Alexeii implored, "please, as a friend I ask you to sit down. There are things we must discuss."

"You don't believe me?"

"I'm sorry, but no."

Carsdale muttered "Rats," and reluctantly sat down.

Peters was sitting at his console, gargling bourbon and looking at all the bright red launch buttons when Lockwood brought in the latest report on the Carsdale mission.

"They've brought him to their main defense center in central Russia, sir. He's actually in their control center right now."

"By God! You mean one of our boys has infiltrated their setup?" Peters put down his drink and stared at his young aide. "We've got a boy on the inside?"

"Not exactly, sir."

"What's that supposed to mean, Lockwood?"

"Well, he's there, sir, he's definitely there but our sources say he's pretty well guarded. They've captured him, sir."

"Then why in blazes did they take him to their most important military installation?"

"We really don't quite understand it, General. It seems they're giving him a tour—"

"What kind of a crack is that supposed to be, Captain?"

"Well, sir, as near as we can figure it, the Russians don't know what Carsdale is yet. They have all the information on him that we have, but they don't seem to understand why we sent him. I suppose they're curious to see what he can do."

General Peters pondered that. Carsdale was incapable of doing anything, anything at all. It had been absurd to send him in the first place. "Lockwood—"

"Yes, General?"

"Ah-h-h, Lockwood, explain something."

"If I can, sir."

"Tell me again why we sent Carsdale to Russia? Please?"

"No reason, sir. The Psych-Tech boys were looking for a new angle, something really new, and one of them dreamed up this nonmission mission. I believe the idea's based on Carsdale's bad karma, and how his planets are lined up strangely. I never quite understood it either."

"Captain," Peters mumbled, gazing numbly at the rows of red buttons in front of him. "Why don't you fix us both a drink?"

"Yes, sir. Thank you, sir."

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Karma. Astrology. Carsdale. Whatever happened to warfare, Peters wondered vaguely. Killing and winning and guts. Simple homespun warfare—

"Now, Mr. Carsdale, please try to meet us halfway. That's fair, isn't it?"

Carsdale looked at Alexeii, perplexed. "But this is war, isn't it? I'd be a traitor to give away any secrets, right?"

The little fat man sighed and nodded. "Yes, that is true. But you don't have any secrets, and as far as that goes, we've shown you our best secret, this control room. So does that make us traitors, too? Does that make me and Marshal Yanoff traitors?"

Confused, Carsdale shook his head. "I don't think it does."

"Fine, fine, we agree on something. Now Mr. Carsdale, just answer one question. What are you supposed to do?"

Looking miserably at his feet, Carsdale muttered, "They didn't tell me that."

Yanoff snorted contemptuously. Carsdale sat up, offended, and said vehemently, "Well, they didn't. They didn't have to."

"What's that supposed to mean?" Alexeii asked.

"Just that. They figured I could work it all out myself, all by myself," Carsdale replied smugly.

"Idiotic," Yanoff rumbled.

"Not so idiotic," Carsdale sneered. "I'm here, aren't I?"

"Yes, of course," Alexeii murmured, trying to calm the pair down. "But, I might add, you are under . . . shall we say . . . our supervision. Yes?"

Carsdale didn't have an answer for that one.

Yanoff stood up, towering over Carsdale contemptuously. "Hey, you, American super weapon, come here. Sit down in my chair."

"I don't want to," Carsdale muttered.

"Sit!!" Carsdale shuffled over and sat down. "Now, you see red buttons? Push one, and nuclear rocket is fired. Anywhere in world. You want fire rocket, super weapon? Sure, go ahead, push. Push!"

Carsdale was skeptical. "Which one is aimed at Moscow?" he asked bitterly. Without hesitating Yanoff pointed to one of the buttons and flicked on several wall screens. One showed a launching pad, the other a laser installation outside Moscow.

"Push, super weapon, push!"

"You're kidding," Carsdale murmured.

"Push, now!!"

"O.K., Pops," Carsdale smiled and pushed the button. Seconds later a missile rose beyond camera range of the first screen. Almost immediately the second screen showed an automatic laser swinging around. A beam of intense light was emitted for all of a half second and then the laser swung back to its original position. That was all; Carsdale was disappointed, somehow.

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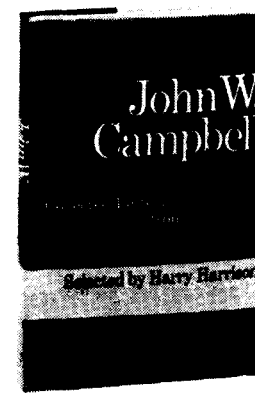

Maybe it was the bourbon he'd been drinking all day but when the boards showed a Russian missile streaking toward Moscow and then being shot down, General Peters couldn't get interested. So the Russians were shooting at themselves. Why not, it was that kind of a war. "Lockwood?"

His aide was also feeling the effects of Peters' bourbon but stood stiffly at attention. "Yes, sir?"

"Got any idea what that was all about, Lockwood?"

"Not really, sir," the aide said, struggling to maintain his balance. "On a bet I'd say it has something to do with the tour Carsdale is getting."

"Tour," Peters muttered.

"Yes, sir." Lockwood sat down.

"Lockwood," Peters began. The aide stood up again reluctantly and saluted. "Tell me something, son. Do you think anybody's really trying to win this war? Really?"

"We're making every effort, sir." Captain Lockwood murmured reassuringly.

"You really believe that?"

"Yes, sir. Without an all-out effort on our part, the Russians would eventually get ahead of us somehow. Then it would be all over, sir."

"You know, that's the way I always saw it, Captain. But now I'm not so sure—"

"What do you mean, sir?"

"There haven't been any results, damnit. No victories, no deaths, nothing to let you know there's a war

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on. Just a wartime economy, and a fat one at that."

"It's not much of a war, is it, sir?"

"It's the worst war I've ever been in, Lockwood. It makes me want to turn in my stars. I feel so helpless."

"Now, General," Captain Lockwood said softly, "what would happen to us if we didn't have soldiers like you to keep us on our toes?"

Peters thought about that for a moment and then he sighed. "I suppose you're right, son."

"You see, Mr. Carsdale," Alexeii began, "our defenses are quite good. You could fire all the buttons in this center and it would do no good. So now, perhaps, you could tell us why you were sent at all?"

It had been a hard day, hard physically, hard on his wits, but above all hard on his ego. Carsdale found himself sobbing. "I don't know, I don't know, they just told me to do what I could and win the war and—"

Yanoff motioned for the guards to take him away and two of them took Carsdale by the shoulders to help him to his feet. Shaking with his sobs, Carsdale got up out of the marshal's chair and inadvertently knocked the marshal's cup of tea into the marshal's console. He was about to apologize when the room went dark and Central Russia was suddenly without a command post.

Eight thousand miles away the display board depicting the status of Central Russian defense installations began to dim, as one light after another winked out. Within ten seconds after the first one turned off, the entire board was a dull unlit green. General Peters stiffened, quivering. "What . . . what does this mean, Captain Lockwood?"

But Captain Lockwood didn't answer. Captain Lockwood was in the process of fainting.

Amid the chaos and uproar of a command post going berserk, one man remained at his post, performing his patriotic duty. He sat there, smiling slightly, pushing one red button after another until there were no more buttons for him to push. And then he sat back in his chair to watch the board begin to light up again.

"Good old Carsdale," he murmured happily.■

The Analytical Laboratory • August 1971

PLACE	TITLE	AUTHOR	POINTS
1	The Lion Game (Pt. 1)	*James H. Schmitz*	2.15
2	A Little Knowledge	*Poul Anderson*	3.00
3	Ratman	*F. Paul Wilson*	3.36
4	Dummyblind	*Douglas Fulthorpe*	3.44
5	Analog	*Grant D. Callin*	4.17
6	Letter From An Unknown Genius	*Colin Kapp*	4.39

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KELLY FREAS

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by WADE CURTIS

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Dr. Arturo Martinez decided he wasn't as young as he used to be. It wasn't a completely new decision, and at this hour of the morning he didn't even regret it. At his age a man had no business staying up all night, not when he had to get up early in the morning. But Dianne had enjoyed the company expense account night in Los Angeles; in fact, she enjoyed it so much that Art had to get his own breakfast.

Art Martinez felt a perverse satisfaction in noting that his houseguest looked no better than he did despite being fifteen years younger than Martinez's forty-eight. Bill Adams might be a bright young fellow with accountant's ink instead of blood, but he sat gloomily across the breakfast table, staring with pale-blue eyes at his eggs and saying almost nothing. Arturo grinned.

"Feel all right?"

"About as well as you do," Adams answered. He managed a smile, smoothed back crew cut sandy hair. "I don't suppose we've got time for much breakfast anyway."

"No." Dr. Martinez hesitated. Adams was a friendly young Anglo, but you never could tell . . . "Look, Bill, I am not sure just what it is you want to do out there today—"

Adams shook his head, winced slightly at the exertion. "I keep telling you, don't worry about it. You're Acting Director and you're in charge. I'm just a visiting fireman. With a hangover."

"Well, O.K.," Art answered. Bill Adams had flown in from Santa Barbara the night before. A likable young fellow, quick to smile, interested in every aspect of Nuclear General's San Juan Capistrano Breeder and Power Reactor. He didn't act at all like one of the almost legendary people old man Lewis kept around him, the young fellows with no heart and eyes to see figures only. Adams carried a small circular slide rule, had a habit of popping it out to make extrapolations from the figures he was given. He knew more about nuclear reactions than the accountants and more about the economics of power sale than the physicists, and he listened to everything with a genuine appearing smile. The only trouble was that he *had* been sent down by Mr. Lewis, and the rumor was that Nuclear General only sent Adams where trouble was expected. Dr. Martinez tightened thin lips over white slightly gapped teeth at the thought. There wasn't any trouble at San Juan Reactor and there wasn't going to be any trouble. The physicists were happy with the reactor, the business manager satisfied with power sales, and Art himself supervised the ocean farms.

They finished their breakfast and Art led the way to the garage. He unplugged his Oldsmobile Electric and waited for Adams to comment as they got in. People always did.

"You like this?" Adams asked.

"It's all right, looks like a car and will out-accelerate anything you've got, I bet. Corners very well, too."

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He settled in, buckled his safety belt. Adams ignored his.

"What about the range?"

"There you have exposed the weak point," Martinez admitted.

They drove through the quiet streets of the walled housing development. Dr. Martinez looked around with quiet satisfaction. When he was growing up, going to college, chicanos did not live in places like this. Now he had a home as fine as anyone else, and he called no man *"Patron."* It was a long time since he had– He eased the car over an enormous road hump, but wasn't gentle enough for Bill Adams's head.

"Sort of rough on cars, those things, aren't they?"

Art smiled. "Sure, if you are not careful you will lose some springs. Better than losing the children to hotrodders . . . about the electric car, Bill. I admit it is not as nice as a natural gas/gasoline vehicle such as the Jaguar we took to Los Angeles last night, but if the bossman ecologist in this town won't set a good example, who will?"

He took the road through the town of San Juan Capistrano, past the old Mission where he and Dianne and Henrietta attended mass. His son Candelario was at Nuclear General College and–Monsignor O'Malley was outside and waving to them. The men stopped work on the Mission to wave as well. All the workmen wore Nuclear General coveralls.

"Advertising?" Adams asked.

"You might call it that, but it comes from the Community Relations budget. The old Mission was hit very hard by the last earthquake. With Nuclear General construction technology this repair should be the last. The only difficult part is hiding the fiberglass and resilient bracing so the Mission looks as it used to."

"Pretty old building . . . Eighteenth Century?"

"Yes."

"You seem pretty proud of it."

"All of us in this town are proud of it," Martinez said. He didn't want to, but decided to explain. Dianne thought he should be very careful with this young man who was eyes and ears for *el patron* Lewis. The title his family used for the president brought a thin smile. "Look, the men were not doing anything. We don't start construction on the new building for a month, and I do not need them for work at the plant. The earthquake did us no damage. Why should I not send them out to work on the Mission?"

"Easy," Adams protested. "I wasn't complaining. I keep trying to tell you, Art, you're the Acting Director. Until Mr. Lewis makes up his mind whether he can put a nonphysicist permanently in charge of a reactor, you're running the show. Personally, I think he's going to give it to you . . . if you want it. Do you?"

The question was casual, but Art knew the answer would be important What could he say? The director was an important man, perhaps the most

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important man in the community. What would it mean to the chicanos to have as top employer the son of a wetback bean picker? And not just the young men with education, but the dropouts, the militants, might see hope . . .

"Yes, I want it. But I will not resign if I do not get it."

"Good."

They stopped at a traffic light in Mission Square. There seemed to be more of the long-haired counter culture youths than usual. They called themselves strange names, such as happies and jeepies, which were two different things although Martinez didn't know which was which.

"You get many of those here?" Adams asked. "We're generally surrounded by them at Corporate Headquarters."

"San Juan is not much of a hangout for them," Arturo answered. "The Mission is not a state park, you know. Monsignor O'Malley will not put up with any nonsense on the Mission grounds, throws them out for nudity, drugs—"

"There's one who's on your side." Adams indicated a young man wearing a large button proclaiming "ECOLOGY NOW!"

"Yes."

"You're not very enthusiastic."

"Should I be?" Dr. Martinez drove on through the old town, down toward the beach. His mouth tightened again as he spat the words out. "It took me ten years of study to become an ecological engineer, and even now I see just how little I understand. It was not easy study, for me. And I did not go where they had special programs for chicanos. I went to Cal Tech, and after that to Westinghouse. Now some *cabrone* with a major in 'brotherhood' pins on a green and white badge, and by God he is an ecologist fit to tell me how to operate the reactor."

"Easy," Bill Adams grinned. "That's the baby there, eh? Pretty, isn't it?"

It was an impressive sight, although Arturo had seen it too often to notice unless someone called his attention to it. The reactor was built on an artificial island some fifty acres in extent, connected to the mainland by a wide causeway. A yacht harbor and fishing boat complex nestled in the sheltered bays the island had created, each boat swimming in a plastic bath to protect it from bottom growth. The sailboats were deserted, but Fishboat Harbor was a bustle of activity.

The reactor complex was large, but there was little to see. Three big blast retention domes housing two completed reactors and the skeleton of the new one under construction, two office buildings, a windowless fiberglass laboratory, all surrounded by wire fence. The generator house was also windowless, a combination of pre-stressed concrete and more fiberglass. A circuit breaker farm stood outside the powerhouse, impressive with its crazyquilt of oil

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bath transformers, insulators hanging like Spanish moss from transmission towers, a jumble of wires, but hardly unusual.

At the far end the island was being slowly expanded. When it was completed there would be a complex of pools with ordered rows of piping and valves in geometric perfection, the desalinization plant. Its construction had been delayed because the voracious demand for power in southern California outstripped even the need for water, and the fresh water facility would have to wait until the new reactor was complete. When it was done—provided it wasn't needed as power again—fifty million gallons of water a day would be available for Imperial valley farms.

The most spectacular sight at the San Juan Reactor complex was offshore. Arturo pointed proudly: this was his, and it was unique in all the world.

"The colored areas are the plankton blooms," he explained. "We take raw sewage from San Juan Capistrano, part of San Diego, San Clemente and other beach cities. It is treated in special underground vertical holding tanks, and we are able to use waste heat from the reactor to speed up the process. Then we take the effluent, heat it again with more so-called waste heat, and dump it onto the bottom along five miles of pipe. Because it is warm it rises through the baffles and is eaten by the plankton strains we have developed. It is very warm out there, 100°F, and that means the diatoms and rotifers have a very high metabolic rate."

"Pretty impressive," Adams said. He shaded his eyes with one hand, stared at the water, ignoring the pain the bright morning sun was causing. "What brings about all the colors? It looks like a rainbow."

"Those are different temperature areas, each feeding a different predominant species. Now look out to the edge of the bloom areas, where the boats are. That is heated water also. We have special species of herring, smelt, sardine, and cod living there. The heated water keeps predators away, and we harvest over six hundred tons of protein to the square mile—"

"That's pretty good," Adams said. Then he laughed. "Actually I don't know if it's good or not. Nothing to compare it with."

Art smiled. He could like this man. "Ordinary pasture ashore will yield about fifty tons to the square mile. The best natural fishing waters in the world, which are off Peru, give four hundred or so."

"I am impressed." Adams whipped out his circular slide rule, spun the index wheel rapidly. He put it back in his pocket and whistled.

"Yes." Martinez drove down toward the reactor island. "And we are only starting. We have planted oysters on rafts also. In other places they harvest yields of tons of protein to the square mile that way."

"But you don't get that yet?"

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"We have had trouble developing strains that will survive and breed in high temperatures."

"Give them cooler water," Adams said. He caught himself and laughed.

"Sure." Martinez grinned cheerfully. "It gets to me that way, too. There is such a protein shortage you start thinking of what to do and forget the whole project is intended to use the waste heat from the reactor. But we are planting high temperature tolerant strains of mussels now, they grew well in the laboratory and we have hopes. Many countries are watching us."

The guards saluted as they passed through the outer gates. Art drove to his parking slot by the gleaming white main office building. The number two tombstone had his name painted on it. It had been a great day when that was painted, but now number one stood ominously blank. Martinez could have taken number one, but if he didn't make director he'd have to give it up.

It would be all right if he never became director, but to take complete charge and lose it would be intolerable. They walked silently inside, took film badges and dosimeters from the rack. Directors of reactor facilities are always physicists. *And Anglos,* he added to himself, but angrily dismissed the thought as unfair. Mr. Lewis was dedicated to profits, could hardly care if a man were chicano or purple if the two magic numbers came out right. ROI and PII, Return on Investment and Position in the Industry, these were Lewis's gods and his worship of them pushed out lesser prejudices.

And why do I want it, he asked himself. No one interfers with me, and being director is sorrow, a worry with sales rates and personnel and administration, the ruin of a good scientist. He'd told himself that a thousand times—

He'd kept his old offices, but he took Adams to the director's control desk. Three walls of the tower room were covered with functional diagrams of the reactors and the powerhouse/ecological complexes that served them. Lights winked, dials showed temperatures and flows, water and steam and liquid sodium, power output, sewage flow rates, sea temperatures, and always the winking green lights for safe temperature in the reactor cores. Models of the control rods hung above the plastic representation of the breeders, suspended by a magnetic field exactly as their real life counterparts were poised to plunge at the touch of a scram button.

A duty officer in another building had duplicates of the intricate console system. In practice the director never used his magnetic keys to unlock his desk and override his operating engineers' decisions, and the engineers themselves had little to do but watch the computer controlled operations. Still, the director's tower was the symbol of power and author-

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ity. From here everything could be done, provided the computer did not disagree and scram the reactors regardless of the director's will.

"Childe Harolde will be impressed with this," Arturo said. "Have a seat, Susie will bring us coffee."

"You take Senator McGehee a bit too lightly," Adams warned. "He's after Nuclear General because Mr. Lewis supported Garner last year. And that children's crusade of McGehee's isn't the joke some columnists want to make of it. The man's dangerous."

"We have no government support," Martinez protested. "This whole complex was built on Company funds. Lewis and Van Cott gambled everything they own on it after the AEC lost the appropriation for a fast breeder—"

"Easy," Adams laughed, "I know the story, Art." He chuckled and after a moment Art relaxed, laughed with him. "Sure, it was a legendary gamble that paid off," the troubleshooter continued. "A new breeder process and power reactor without an experimental prototype. But your power sales are all that keeps this facility out of the hands of its creditors, and with Senator McGehee on the warpath, we're worried."

"So that is why you are down here?"

"Sure. We're not worried about technical questions. You've done well, as well as Gladstone, maybe better now that the fishing is making money and you've got sewage disposal payments from San Diego. We can't complain about any of that, but—"

Adams was interrupted by the arrival of Martinez's secretary. Adams grinned at her while Martinez hid his amusement. Last week she'd worn shorts, now she sported a thin nearly transparent skirt reaching within inches of her knees. Art's wife paid little attention to style changes and Henrietta took after her mother, but Susie followed them slavishly. She smiled, set out the coffee, and saw the men were busy, vanished quickly in a flurry of bright blue and red checked stockings. Adams continued to grin after she was gone, then swiveled to face Martinez.

"Look, Art, get it through your head I'm not here after your job. Secretary, maybe, but not your job—" He winked. "The Old Man was scared of this McGehee thing, sent me down to be on hand just in case. That's all, now relax." He sipped coffee, looked around the room. "Does this place explain the ecology system you've developed? Frankly I've seen reactors, we've got three more complexes, but this sewage disposal through protein production is unique."

"Surprised you don't know about it," Art said. He was gruff. "I've briefed corporate headquarters often enough."

Adams laughed again. "You keep misunderstanding, Art. I'm not one of the financial whiz kids, I'm not a management supervisory VP, I'm a

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troubleshooter. You've never had trouble, so there's a lot about your operation I don't know. I see I ought to learn more, since the Company's new seacoast reactors will probably have to use your systems—"

Senator McGehee's helicopter arrived at eleven. Dr. Martinez, his dark hair disarranged by the whirling winds of the jet chopper, anxiously shook hands with the thin-faced senator. He's even younger than his pictures, Martinez decided. Of course he inherited his seat, as nearly as anyone can inherit a Senate seat in this country.

"This is Jim Reilly," McGehee was saying. His voice was a mixture of Harvard and his native mid-west. "My Administrative Assistant." He made it sound as if he'd just introduced the President.

McGehee wore his hair in the tangled forward sweep made famous by his father, but unlike most of the McGehee official family Reilly made no attempt to copy his boss. He wore a drooping bandit moustache, long sideburns, and flowing locks. It was difficult to tell how old Reilly was, but Martinez decided he wasn't over twenty-five. McGehee was just over thirty, of course, barely eligible to be a senator of the United States.

"ECOLOGY NOW! POWER TO THE PEOPLE!" As the helicopter engines quieted they heard the shouts. A group of happies and jeepies was clamoring at the main gate. Dr. Martinez saw at least fifty, and more padding barefoot over the causeway from the mainland. Senator McGehee grinned boyishly and raised his fist in the waving salute his family affected. The bearded youths outside cheered.

"A MAN OF THE PEOPLE! POWER TO THE PEOPLE!"

"My public," McGehee said. "I suppose you have to keep them locked out there?"

"I . . . uh—" Arturo Martinez had no words.

"The Atomic Energy Commission insists that all visitors register in advance," Bill Adams said smoothly. "Shall we go inside, Senator?"

The young female technician who zeroed their dosimeters giggled loudly, obviously enraptured at the chance to touch the senator. No question about it, Martinez decided, this fellow is as near to an idol as the kids have today. Susie had barely been able to contain herself when she found he was coming, even Henrietta had wanted to come out to the plant . . . I wonder if he's earned it? They turned to go inside, and Arturo caught himself.

"You didn't register mine," he told the technician. There was an embarrassed silence before the girl took the proferred pencillike instrument, inserted it in the computer reader. In less than a second the instrument was reset, the dose readings registered in Dr. Martinez's permanent records. They went inside the reactor dome.

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"What would have happened if you'd forgotten, too?" McGehee asked.

"The computer would have caught it; with its detectors it can spot an unregistered dosimeter."

"Would you have fired that nice young lady?" the senator insisted.

"Nuclear General doesn't operate that way," Adams said quickly. "Mr. Lewis thinks that if an employee isn't interested in doing a good job, he shouldn't be with the Company, and if he is, threats aren't needed."

Art nodded to himself. It was only because of that policy that he could ever be director. Of course the incident was already noted by the computer and now in the girl's training record. There was no need for her at that station, the computer and a guard would be enough, but all health physics trainees got a tour of gatewatching as a probationary test of attitude and thoroughness.

The reactor itself wasn't impressive since it was hidden behind layers of concrete and shielding, an enormous regular octagon in the middle of the huge white floor. Above the reactor the safety rods looked like thick javelins perpetually falling to earth. Martinez tried to explain the reactor operation, though he could see that the senator was paying little attention.

"The reactor burns Plutonium 239 in long stainless steel rods we call needles," Martinez said. "The plutonium fissions to give us residual fission products and neutrons. One of the neutrons is used in another plutonium fission reaction, while the others are free to hit the Uranium 238 blanket surrounding the core. When Uranium 238 captures a neutron it becomes Plutonium 239 after going through some intermediary stages—We can double our original fuel supply in about four years, meanwhile producing over 2,000 megawatts of power."

"That's slightly more than Hoover dam," Adams told the senator with a grin. "I can never keep these numbers straight. The power is sold to southern California electric companies, of course."

McGehee nodded. "The plutonium you produce. Will it make bombs?"

"Yes," Martinez answered. "We sell some of it to the AEC."

"I thought so," McGehee said. "Make a note of that, Jim." Reilly nodded vigorously.

"We sell it to the AEC because the government requires us to do so," Bill Adams pointed out smoothly. "Actually, the world market price for fuel plutonium is well above what the AEC pays us."

"You don't lose money on it," McGehee said.

"No, sir, but we don't make nearly as much on weapons grade as we could on fuel grade." Adams spoke rapidly, but the senator was whispering something to his assistant. They went through the reactor building, past radiation monitor stations

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where they inserted their dosimeters, to the next dome.

"This is another breeder reactor," Martinez told them. "It is shut down now for routine servicing and recovery of fissionables. This one has several experimental features including an auxiliary breeding cycle to convert Thorium 232 into Uranium 233. There is no other like it in the world."

"It looks like a lump of concrete to me," McGehee sniffed.

"Well, yes, sir, they all do," Martinez answered. *Tonto Anglo*, he thought to himself, but growing up in an Anglo world had taught him control over his voice if not his thoughts. "If you would like, we can put on radiation armor and go inside the shielding. There are men working there now and it would be safe enough."

"No, thank you." McGehee turned to his assistant. "You have noted the elaborate precautions they take, even for a routine visit like this. Obviously a very dangerous place."

"Wait a moment, sir," Martinez protested. Bill Adams shook his head in warning, but Art persisted. "We take precautions here because anyone working around a reactor would be loco if he did not, but we have safer working conditions than steam generators."

"Certainly, certainly. And nuclear power is always safe, can't harm anyone," McGehee said caustically. "You needn't give me your standard snow job, Dr. Martinez. I've heard it all before. Next you'll tell me the Santa Fe disaster didn't happen."

"It did not happen to a Nuclear General plant," Martinez insisted. He felt his voice rising out of control, fought to remain calm and polite to this, this *hijo de cientos padres* . . . "We learned much from that blowup, with what we have learned. . ."

"With what we all have learned, we still go on building these pollution sources," McGehee said. "But I think we can put a stop to that . . ."

"DIRECTOR MARTINEZ, DIRECTOR MARTINEZ. 771, 771. DIRECTOR MARTINEZ."

"Excuse me," Arturo said. He went to one of the many telephone stations, dialed 771.

"Pulaski, Security," the phone said. "Hate to bother you, sir, but there's a big ugly crowd at the main gate. Insist they'll talk to Senator McGehee. I think they're going to break in."

"I see. Have you called the local sheriff's station?"

"Yes, sir, we've got a couple carloads of deputies standing by, but them boys ain't going to do much, Dr. Martinez. Not since two of 'em got sent to jail by the Feds for violating the civil rights of them rioters at the Irvine University, they ain't. Deputies are scared of the Feds, and between you and me, Doctor, I'm scared, too."

"Yes. All right, Pulaski. Thank

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you." He turned back to the group. "There is trouble at the main gate. I think we had better go there."

The crowd was shouting. Some held up banners. "ECOLOGY NOW! END THERMAL POLLUTION! NO MORE DEFORMED CHILDREN! SHUT IT DOWN, SHUT IT DOWN, SHUT IT DOWN!" The shouts were random, but when Martinez and the others appeared they chanted in unison.

"ECOLOGY NOW, SHUT IT DOWN! ECOLOGY NOW, SHUT IT DOWN!" The crowd surged forward, pushed against the main gates. Someone flashed a wire cutter, and the gates flew open.

"What do we do, sir?"

Martinez turned to see Captain Pulaski. His company police were slowly falling back, facing the crowd. "Should we throw them out?"

"You'll do no such thing!" McGehee snapped. "They aren't hurting anything. Have you got a bullhorn?"

"Yes, sir."

"Give it here." McGehee took the speaker, turned to the crowd. "HELLO, I'M SENATOR MCGEHEE."

The chant stopped. Someone cheered, then all yelled approval. "POWER TO THE PEOPLE, POWER TO THE PEOPLE," the McGehee family slogan.

"YOU CAN BE SURE THAT WE WILL ACCOMPLISH SOMETHING HERE TODAY," McGehee told them. "NO LONGER CAN THESE MONOPOLY COMPANIES GET AWAY WITH IGNORING THE ENVIRONMENT. BUT THIS IS NOT THE WAY TO DO IT. VIOLENCE IS NOT THE ANSWER. PLEASE BE PATIENT WHILE I SPEAK WITH DIRECTOR MARTINEZ."

"NO JIVE, SHUT IT DOWN. ECOLOGY NOW, SHUT IT DOWN! ECOLOGY NOW, SHUT IT DOWN!" The chant resumed, but the crowd seemed held in place near the main gates. Then suddenly a small group charged forward to the doors of the reactor dome.

"Pulaski, keep them out of there!" Martinez ordered. "*Maria sanctissima* if they get in that building—"

"Shall we go inside?" Bill Adams said quietly. "They don't seem anxious to break into the reactor just yet—"

"ECOLOGY NOW, SHUT IT DOWN! ECOLOGY NOW, SHUT IT DOWN!"

"Senator, don't you understand, we can't shut the system down," Martinez pleaded again. From the big control room in the director's tower they could see hundreds of counter culture students surging through the plant yards. Police held the doors of the reactor and laboratory buildings, but already the students were inside some of the offices and annexes. And where is Adams now that I need him? Martinez thought. Where has the great Anglo

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troubleshooter gone now that trouble has found us?

"They've trashed two offices and the biology annex," Pulaski reported. "Dr. Martinez, I'm willing to take the chance on a San Juan Capistrano jury acquitting me. Let me clear out those buildings."

"They have threatened to break into the reactor if you do, you would have to shoot someone to prevent that," Martinez said thoughtfully.

"Repression!" McGehee snorted. "Your only answer. Have you tried listening to them?"

"*Si*, we have tried, but they are not reasonable, they only chant," Arturo answered. "Ecology now, shut it down . . . end thermal pollution . . . end birth defects. When I try to explain, they chant louder. They will not listen to me."

"They've had to listen to people like you all their lives," McGehee said. "They don't see any point in it now. Dr. Martinez, these are intelligent students. They've heard all the arguments, they know what you're going to say, why should they hear it again? Listening just puts off action, and they want action, not rhetoric. If you really want them to leave, shut down the reactor!"

"But I have told you, we cannot shut down the reactor—"

"Oh, come off it," Reilly said. Martinez looked up in amazement. The Administrative Assistant had hardly spoken, never except in response to the senator. "Look," Reilly continued smugly. "You jokers put out two thousand megawatts and sell the stuff for three cents a kilowatt hour. That's about thirty grand an hour. You can afford that."

"Thank you," McGehee said. "You see, Dr. Martinez, all you have to do is shut down the plant for today. The students will see that you have listened to them and go home. Certainly a third of a million dollars is a lot of money, but I'm sure Nuclear General will survive the loss."

"But that is not the important loss at all," Martinez insisted. He shook his head wearily. Where was Adams, he was good at talking, they might listen to him. But the troubleshooter had vanished when they came into the office, hadn't been seen for an hour. "Senator, I have tried to explain before. If the reactor is shut down, there is a buildup of certain fission by-products. The most important is Xenon -135. These poison the nuclear reactions so that the reactor cannot be restarted until it has been flushed." He strode rapidly around the room, his hands moving in flowing gestures. *Madre de Dios*, give me strength to convince them. Arturo stopped by the window, pointed out to the sea.

"Out there in the Pacific we have an ecological balance, Senator. It is maintained by high temperatures in the water. If we shut down the plant, before it can be restarted the water will cool. Our tropical strains will die from thermal shock. Predators will move into the rich seas. It will take months, perhaps years, to bring the

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system back to balance because meanwhile the sewage has to go *somewhere.* Without the reactor there is no treatment and our farms will be polluted with raw sewage."

"Then this misplanned facility ought to be closed," McGehee snapped. "If the balance is that delicate, it should never have been started in the first place. We're better off without it, which is what I've always maintained."

"But—" Arturo tried again to explain. That the secondary reactor was usually in operation and could provide enough heat to keep the thermal bio-system operative in case of primary reactor scram. That the cities produced sewage no matter what and— It was no use. McGehee had picked up the phone and was talking to newsmen.

"And that's not satisfactory," the senator was saying. "Repression is never satisfactory in America. We will have no KKK tactics here, not while I am on the scene. We will show everyone it is time for the monopolies to listen to the people."

Susie came into the room, touched Martinez on the shoulder. "Bill . . . uh, Mr. Adams would like to see you outside, Dr. Martinez," she whispered. Did she whisper to keep it a secret from McGehee or because she was reverent in the great presence?

McGehee was busy on the phone, and young Reilly had plugged his attaché case into the terminals of another phone, was punching data into the small console. Probably getting speech material for the senator from the lawmaker's office computer back east, Martinez thought. Neither was paying attention to him.

Adams was outside sitting on the edge of Susie's desk. "How's it going?" the troubleshooter asked. He seemed calm as ever, maddeningly calm.

"Not well," Arturo answered. "They have given us two hours to shut down the reactor before they break in and do it. Of course if they get into the reactor dome we will have no choice but to scram, otherwise there could be an accident. I have alerted Southern California Edison about the possible power loss."

Adams nodded. "I've talked to Mr. Lewis and the Governor, in that order. The Governor's willing to send in the National Guard, but he'd rather not."

Martinez laughed, a hard bitter sound. "I suppose it would not be good for his chances of being President if the Guard fired on those *cabrones.*"

"That's part of it," Adams agreed. "But Senator McGehee could get those kids out of here just by asking them to go. They listen to him."

"Sure, but he will not do so," Martinez said. "I have pleaded with him, and he says he cannot."

"Won't, not can't. He wants to keep what he calls his credibility with them. McGehee's in more trouble politically than you might

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think. The only national support he's got is from the happies and jeepies, and they're losing enthusiasm, demand action." Adams took a battered pack of Camels from his jacket, lit one and puffed slowly. "I think this whole thing was planned, Art. The reactor's not well understood, people are still afraid of nuclear energy. The earthquake and the Santa Fe mess scared them even more, so the 'nuclear pollution' war cry's got a lot of strength. McGehee's trying to ride the wave, hopes to make points by being the people's champ against the giants like Nuclear General. Did you know the underground papers have been urging their people to come here for the senator's visit? For the past three weeks?"

"Three weeks! But we only knew he was coming a week ago ourselves!"

Adams nodded. "Precisely. Anyway we've got a couple of hours. Stall."

"Stall? But we must do something! Call in the Guard, we must protect the plant! What kind of advice is this, stall? Do you know how important this sea farm ecology is to the world? We must act!"

"Yeah, but I've got a secret weapon coming. I hope."

"But—no! We must take action," Arturo said.

Adams sighed deeply. What he was about to say was distasteful. "Dr. Martinez, on Mr. Lewis's authority you will do nothing without my O.K. I don't like to put it that way, but is it understood?"

"*Si, Patron.*"

Adams looked pained, but the door was opening and they saw Senator McGehee come out. "Right. Sorry you feel that way, but that's it. Take any precautions you want, but before you move against those kids you check with me. And get hold of yourself man, it's going to be a long wait for both of us."

"ECOLOGY NOW, SHUT IT DOWN! ECOLOGY NOW, SHUT IT DOWN!"

"Time's almost up," McGehee observed. "What are you going to do, Director Martinez?"

"I still ask you to speak to them, Senator. You can persuade them to leave, and no one will be hurt."

"No. I couldn't, and I'm not interested anyway. I don't really care if your facility is destroyed, Martinez. I've no use for private nuclear reactors, I think they are dangerous and absurd. Why should the Lewises and Van Cotts make money from atomic energy when the research investment was made by all of the people?"

"But it wasn't, Senator," Adams said carefully.

"Are you trying to tell me the Manhattan Project was privately financed?" McGehee snapped.

"I wasn't referring to the Manhattan Project at all," Adams said. "That was years before you were born. I'm talking about private research, which was significant even

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back in the '60s, and the risk investment that built this plant. If Lewis and Van Cott hadn't put up their fortunes and borrowed every nickel they could get, these breeder techniques would never have been developed, not to mention Dr. Martinez's eco-systems which you won't even take the trouble to learn about."

"Humph." McGehee ran tapering fingers through his thick hair. He was not accustomed to being spoken to in that tone of voice and he resented it. "In any event I notice you are willing to commit murder. I see you have brought in National Guardsmen by sea."

"But we must protect the plant, Senator," Martinez insisted. "Don't you understand, Senator, the technology we are developing here can prevent famines, malnutrition, can—"

"No. I don't understand how further pollution of the environment is going to do all that," McGehee sniffed.

"But if you'd only listen," Martinez said despairingly. He was interrupted by a comment from outside the office door, a thick drawl.

"That always was Johnny's problem in a nutshell, he never did listen to anybody."

They swiveled to face the newcomer. He was short, almost dumpy, with a swelling paunch that forced out his bright-colored flowered vest. His white hair and wispy white moustache were alike uncombed, and with his dark coat he seemed almost a parody of the elderly politician, but there was nothing amusing about his eyes. Martinez recognized him now, Representative Craig, Chairman of the joint Senate-House Committee on Atomic Energy.

Adams got hastily to his feet and grinned. "Glad to see you, sir. You're in time, but just barely—"

"Saw the trouble outside." Craig faced Senator McGehee. "Understand you won't talk to that rabble, Senator."

"Don't use your imperial tone on me," McGehee snapped. "I don't have to take orders from you. Besides, you don't know any more about nuclear reactors than I do, I've heard you admit it."

"Maybe not," Craig drawled. He hitched his vest more comfortably over his spreading middle and looked around for a chair. "I never was much good at technical details, but I sure spend a lot of time looking at results. Now this plant turns out power, produces nuclear fuel, and gets rid of sewage. Last year, and the year before that, the Southern California Chamber of Commerce had me out here to present San Juan Reactor with a reward for the fewest lost-time accidents of any industry in the district. I understand that kind of results, boy."

"Competent scientists have assured me this place is unsafe," McGehee said. "Men from the Atomic Energy Commission labs."

"Why sure they did," Craig

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chuckled. "Did you understand a word they said or just hear what you wanted to? Those bureaucrats have a powerful motive for wanting their agency to take control of a successful operation like this one, and that's what they're after, Johnny. No way is this place going to be closed, the power's needed too much. Now, like I told you, look at results. It seems to me it was the AEC boys who had the only serious accident with reactors so far."

"The whole idea of nuclear power is dangerous and unneccessary!" McGehee shouted. The strain showed in his voice now, and something more as well. Martinez watched in fascination, remembering McGehee's precise self control when they were in the reactor domes, his studied disinterest but strange nervousness—the man was pathologically afraid of nuclear energy! There were a lot like him, but most were not senators.

"Lord love you, civilization's dangerous," Crag was saying. He took off old-fashioned spectacles and polished them with his handkerchief. "You pack this many people in this small space, give 'em all the gadgets they think they got to have to stay alive and happy, of course it's going to be dangerous. Without the best technology we can develop, though, we won't live in danger. We just won't live at all."

McGehee started to say something, but Craig held up his hand, palm outward. "You just listen to me for a second, boy. What you're about to say is there're too many people and we have to do something about that, right? All I can say to that is anybody who uses a slogan like 'power to the people' sure looks funny with thoughts like that. Who you going to kill? The ones that voted for you, or the ones that didn't?"

McGehee sighed heavily and went to the window, pointedly watched the crowd below.

"Now you've stopped listening," Craig chuckled. "I don't blame you much, and maybe you've heard it before. But that's always been your trouble, you know, you never had to listen to anybody. You reach thirty years and your father's brother-in-law resigns the seat he's kept warm for you, and with all that money you never have to go out and campaign, don't listen to your constituents. And those Harvard professors of yours, scared to death of your name, hoping if you liked 'em you'd appoint 'em to the cabinet, you never listened to *them*. Or me either. You know, it's no wonder you're an arrogant little squirt not worth the powder to blow you up."

"You can't talk to the senator like that!" Reilly protested.

Craig laughed. It wasn't his usual chuckle, but a big hearty laugh, full of amusement, and somehow indicating a decision. "Why I sure can, and he's going to listen, too. You keep your long nose out of this, boy,

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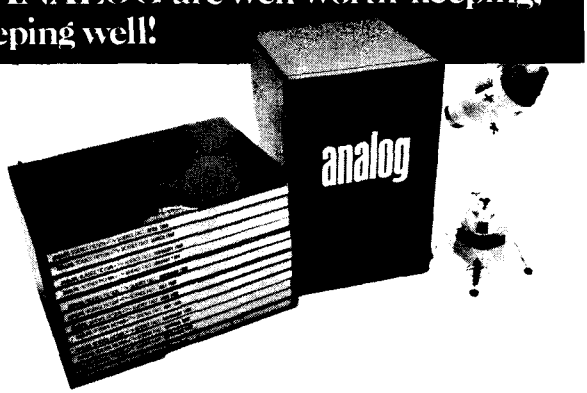

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before I get mad. Now I think I was talking, let's see, where was I?" He stared around the room at the clutter of dials, screens, moving pens and winking lights, instruments recording the smooth flow of as much power as the great falls of Hoover dam.

"I think I was explaining why you're going to make a speech, wasn't I Johnny?" He sighed, almost wistfully. "You know, when your father first came into Congress I'd been there a while. We got to be good friends, your father and I. And he always thought he wouldn't live out his three score and ten, so he asked me to keep a sort of political eye on you if anything happened to him. I did it, too; all the time wondering if you'd ever be half the man your father was, 'cause half that much man would still be a lot more than most of us. And boy, *you have got a long way to go!*"

The smile vanished from the elderly man's face. "I'd never do anything to hurt you, Johnny, but this time it's come to the crunch. Now will you go out and make that speech cause I'm asking you to speak to them?"

McGehee licked his lips nervously, brushed his hair back again and again as if he didn't know he was doing it. "I can't. Those people are expecting—"

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Craig sighed heavily. "I know about that, too, Johnny. Know about a lot of things I never mentioned. Now, you and I, we better go in the next room and discuss what you're going to say to those happies down there, or unless the women in your state are more broadminded than I think they are, you are going to be the shortest term senator ever to come out of the midwest."

"What do you mean?" McGehee asked. There was panic in the question.

"You know what I mean, boy. I'm talking about a secretary name of Alicia Ann for a start. There's more I could say, but not in front of these people. Now are you coming with me, or should this hot-blooded assistant of yours start writing your resignation speech?"

"You've got to give me a little more time—"

"No. GET OFF THE DIME!"

McGehee stared at the older man, saw the congressman breathing hard, his lips flattened in determination. The senator looked at Craig for a long time, then carefully went to the desk phone and took the plug out of Reilly's briefcase console. "All right, Uncle Boyd. Let's go. When you're beaten, give up and save what you can. I guess you taught me that."

Martinez watched in amazement as the legislators left the office.

"You can leave, too, Mr. Reilly," Bill Adams said. He spoke quietly but his voice sounded loud in the suddenly still office. "You can wait in the lobby." Reilly nodded and left without a word.

"Ought to reinforce those gates," Adams said cheerfully. "Well, did you learn something from all this?"

"I have learned . . ." Martinez hesitated. Trivial thoughts conflicted with the more significant. He felt emotionally drained. "I have learned we must increase the advertising budget to get the importance of our work before the public," Martinez answered. "And that I am not really able . . . are you the new director?"

"No. I told Mr. Lewis we had a perfectly good man in charge, and he agreed. Besides, I'd be no use at all. I don't know either physics or ecology."

"Just what is your specialty?" Arturo asked. He should be shouting with joy, but somehow the promotion didn't mean quite as much as he'd thought it would. But Dianne would be pleased—

". . . Of things, but I majored in political science," Adams was saying.

"Yes." Art laughed hard.

"What?" Bill Adams asked.

"Ecology. I have degrees in the field, but it is not enough to know only this." He waved toward the Pacific, blue with patches of reds and greens rising and falling in the gentle swells. "Today I find that politics may be the most important ecological sub-system of them all."

They laughed together as below them Senator McGehee went out into the plant yard and raised the bullhorn. ■

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Priorities

Do you suppose Puck was right when he said: "What fools these mortals be!"?

by BEN BOVA

LEO SUMMERS

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Dr. Ira Lefko sat rigidly nervous on the edge of the plastic-cushioned chair. He was a slight man, thin, bald, almost timid-looking. Even his voice was gentle and reedy, like the fine thin tone of an English horn.

And just as the English horn is a sadly misnamed woodwind, Dr. Ira Lefko was actually neither timid nor particularly gentle. At this precise moment, he was close to mayhem.

"Ten years of work," he was saying, with a barely-controlled tremor in his voice. "You're going to wipe out ten years of work with a shake of your head."

The man shaking his head was sitting behind the metal desk that Lefko sat in front of. His name was Harrison Bower. His title and name were prominently displayed on a handsome plate atop the desk. Harrison Bower kept a very neat desktop. All the papers were primly stacked and both the IN and OUT baskets were empty.

"Can't be helped," said Harrison Bower, with a tight smile that was supposed to be sympathetic and understanding. "Everyone's got to tighten the belt. Reordering priorities, you know. There are many research programs going by the boards—New times, new problems, new priorities. You're not the only one to be affected."

With his somber face and dark suit Bower looked like a funeral director—which he was. In the vast apparatus of Government, his job was to bury research projects that had run out of money. It was just about the only thing on Earth that made him smile.

The third man in the poorly-ventilated little Washington office was Major Robert Shawn, from the Air Force Cambridge Research Laboratories. In uniform, Major Shawn looked an awful lot like Hollywood's idea of a jet pilot. In the casual slacks and sportscoat he was wearing now, he somehow gave the vague impression of being an engineer, or perhaps even a far-eyed scientist.

He was something of all three.

Dr. Lefko was getting red in the face. "But you *can't* cancel the program now! We've tentatively identified six stars within twenty parsecs of us that have . . ."

"Yes, I know, it's all in the reports," Bower interrupted, "and you've told me about it several times this afternoon. It's interesting, but it's hardly practical, now is it?"

"Practical? Finding evidence of high technology on other planets, not practical?"

Bower raised his eyes toward the cracked ceiling, as if in supplication to the Chief Bureaucrat. "Really, Dr. Lefko. I've admitted that it's interesting. But it's not within our restructured priority rating. You're not going to help ease pollution, or solve population problems, now are you?"

Lefko's only answer was a half-strangled growl.

Bower turned to Major Shawn. "Really, Major, I would have thought that you could make Dr.

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Lefko understand the realities of the funding situation."

Shaking his head, the major answered, "I agree with Dr. Lefko completely. I think his work is the most important piece of research going on in the world today."

"Honestly!" Bower seemed shocked. "Major, you know that the Department of Defense can't fund research that's not directly related to a military mission."

"But the Air Force owns all the big microwave equipment!" Lefko shouted. "You can't get time on the university facilities and they're too small anyway!"

Bower waggled a finger at him. "Dr. Lefko, you can't have DOD funds. Even if there were funds for your research available, it's not pertinent work. You must apply for research support from another branch of the Government."

"I've tried that every year! None of the other agencies have any money for new programs. Damnit, you've signed the letters rejecting my applications!"

"Regrettable," Bower said stiffly. "Perhaps in a few years, when the foreign situation settles down and the pollution problems are solved."

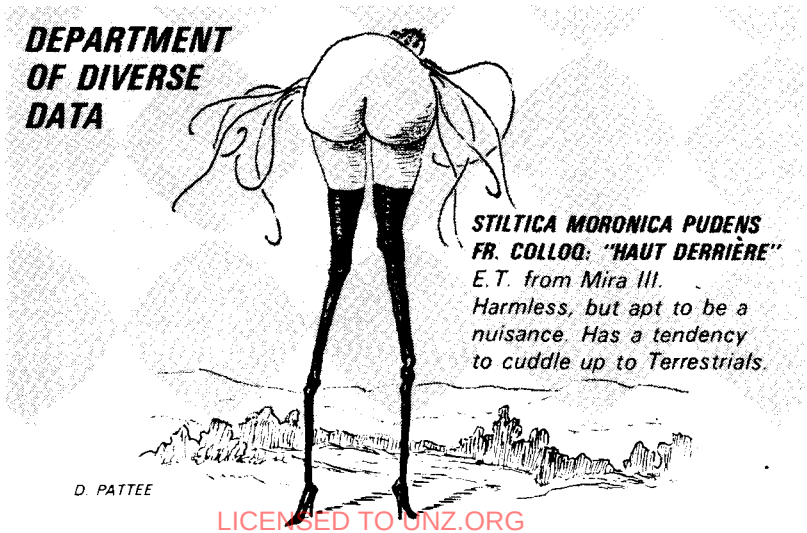
Lefko was clenching his fists when Major Shawn put a hand on his frail-looking shoulder. "It's no use, Ira. We've lost. Come on, I'll buy you a drink."

Out in the shabby corridor that led to the underground garage, Lefko started to tremble in earnest.

"A chance to find other intelligent races in the heavens. Gone. Wiped out . . . The richest nation in the world . . . Oh my God . . ."

The major took him by the arm and towed him to their rented car. In fifteen minutes they were inside the cool shadows of the airport bar.

"They've reordered the priorities," the major said as he stared into his


DEPARTMENT OF DIVERSE DATA
STILTICA MORONICA PUDENS
FR. COLLOQ: "HAUT DERRIÈRE"
E.T. from Mira III.
Harmless, but apt to be a nuisance. Has a tendency to cuddle up to Terrestrials.
D. PATTEE

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glass. "For five hundred years and more, western civilization has made the pursuit of knowledge a respectable goal in its own right. Now it's got to be practical."

Dr. Lefko was already halfway through his second rye-and-soda. "Nobody asked Galileo to be practical," he muttered. "Or Newton. Or Einstein."

"Yeah, people did. They've always wanted immediate results and practical benefits. But the system was spongy enough to let guys like Newton and Plank and even little fish we never hear about—let 'em tinker around on their own, follow their noses, see what they could find."

" 'Madam, of what use is a newborn baby?' " Lefko quoted thickly.

"What?"

"Faraday."

"Oh."

"Six of them," Lefko whispered. "Six point sources of intense microwave radiation. Close enough to separate from their parent stars. Six little planets, orbiting around their stars, with high techonology microwave equipment on them."

"Maybe the Astronomical Union will help you get more funding."

Lefko shook his head. "You saw the reception my paper got. They think we're crazy. Not enough evidence. And worse still, I'm associated with the evil Air Force. I'm a pariah . . . and I don't have enough evidence to convince them. It takes more evidence when you're a pariah."

"I'm convinced," Major Shawn said.

"Thank you, my boy. But you are an Air Force officer, a mindless napalmer of Oriental babies, by definition. Your degrees in astronomy and electronics notwithstanding."

Shawn sighed heavily. "Yeah."

Looking up from the bar, past the clacking color TV, toward the heavily draped windows across the darkened room, Lefko said, "I know they're there. Civilizations like ours. With radios and televisions and radars, turning their planets into microwave beacons. Just as we must be an anomalously bright microwave object to them. Maybe . . . maybe they'll find us! Maybe they'll contact us!"

The major started to smile.

"If only it happens in our lifetime, Bob. If only they find us! Find us . . . and blow us to Hell! We deserve it for being so stupid!"

Tor Kranta stood in the clear night chill, staring at the stars. From inside the sleeping chamber his wife called, "Tor . . . stop tormenting yourself."

"The fools," he muttered. "To stop the work because of the priests' objections. To prevent us from trying to contact another intelligent race, circling another star. Idiocy. Sheer idiocy."

"Accept what must be accepted, Tor. Come to bed."

He shook his blue-maned head. "I only hope that the other intelligent races of the universe aren't as blind as we are." ■

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Foundlings Father by Jack Wodhams

It's not necessarily true that what men want is what they need—and tumbling with friction is a great polishing agent!

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It was not easy to draft a recipe to obtain the security of optimism, challenge, and cause for satisfactions. It was the duty of the Program Moderator to endeavor to, as much as possible, ensure the enduring happiness and fulfillment of the persons he directed.

He plucked his lip and pondered much. He was very, very old, poor fellow.

"No, no, I'm not complaining, of course not, my dear. Good heavens no, everything has transpired so splendidly, hasn't it? So much better than we ever anticipated." Master Oldard looked at a work-hardened hand. "In a few short years we have discovered the contentment to be found in the restoration of fundamental values. Honest toil, honest rest, honest pleasures, and sincere and honest praise for our good fortune."

His wife wound washing between large rollers. "Then why did you object to the Humble Rector's proposal? It's a most sound suggestion, isn't it? A young man past twenty has no reason to be unmarried. At that age he *should* assume such responsibilities. The alternative, as the Humble Rector pointed out, is a patent invitation to mischief."

"Yes, I know, my dear, but it's just that, well, I do think perhaps they ought to be given a chance to . . . explore . . . maybe travel . . . to have a period of adventuring."

"Really," she scolded, "there'll be plenty time enough for that sort of thing later. And travel where? What good could gallivanting about do them, except perhaps to make them restless and give them unnatural ideas? No"—she tossed the wrung clothes into a basket—"the sooner they settle down, the better. People allowed to stay single are bound to get up to no good."

He had to grant that this was so. "That's true, of course. It's just that I thought a little leeway would not have hurt."

"The community helps and pro-

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vides." She fed another item to the rollers and turned the handle. "It's no good having rules, and then permitting slackness. Start making exceptions, and where would it end?" She sniffed. "We wouldn't know where we were. We've seen enough chaos, and everything is nice as it is. The Humble Rector is wise to see that we do our best to keep things this way."

"Yes, my dear, of course." Oldard tried to quell the note of resignation in his voice. "Everything is fine as it is."

"We were here first." The tall man dressed in austere black sounded most reprovingly aggrieved. "Priority is undisputably ours by right of discovery. Our claim markers have been clearly spaced, and seeing these, you had no right to intrude."

S.I.C. Broklin was not in any way to be easily intimidated. "We took a survey, but we couldn't find you. We didn't know how big your party was, whether you might have all died, or maybe moved on without removing your stakes. You weren't broadcasting on any wavelength, so we assumed you'd quit and we came on in."

"You couldn't have searched very diligently," the Humble Rector Galvin Khodpease answered severely. "Now you most certainly have cause to revise your thinking, and so you can remove yourself and your disgusting followers from our habitat just as soon as possible, please. This is *our* home, ours by right of precedence, and we will not suffer brazen trespassing."

"We'd have asked if we could have found you, but like I said, there didn't seem to be anybody at home." Broklin was very calmly reasonable. "We found the place, and it looked real good, tested out O.K., so we thought to give it a try and settle in."

"You did not find it, it had already been found, by *us,*" Galvin corrected firmly, "and you *cannot* settle in because the jurisdiction for such choice is not yours. Your entitlement is nil, and permission to allow your continued presence will not be granted. Such persons, as you evidently are, are most definitely unwelcome here on Trankwiland."

Broklin scratched in the hair on his chest. "I don't see why you should be so upset. You must have had a job finding us, because we haven't been advertising. But now that you're here you can see that we don't intend to cause any trouble, and we won't bother you if you don't bother us."

Galvin reddened. "You are not wanted here, have I not made this plain?"

A tall, auburn-haired woman, munching a fruit, came to stand by Broklin's elbow. Galvin turned puce. "This is our territory, *ours!* You will have to leave, you and your . . . these others. You'll have to go somewhere else, find somewhere else. This place belongs to *us.*"

Broklin frowned as he considered

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the matter. "Come now," he said, "where have you got your headquarters? It can't be very near here. We've scouted five hundred keys each side of here without coming across any sign of you. You must either be camped up north a piece or, be on one of the other continents some place."

"It is no concern of yours where *we* are," Galvin declared. "We can be at any place we might choose to be—particularly, very shortly, *here,* for instance. The right is ours. You will, therefore, pack up yourselves and your bag and baggage, and betake yourselves off to some region far from here. Do I make myself clear?"

Broklin rubbed his nose. "I guess so—but you sound like you're being awfully greedy to me. It's a great green and beautiful world, do you want to hog it all to yourselves?"

"*We* found it," Galvin pronounced loudly. "We traveled centuries to escape the conflictions, the impurities, the vice of other human environments. Here, far removed from the contaminations and persecutions of rooted evils, we have begun again, fresh, unsullied, to grow unspoilt in spiritual truth. It is *our* world, God-given to us. Our path was guided, and after the long journeying of our endless sleep, we were brought here. It was God's wish, and it is our destiny."

"Well it looks like our destiny also," Broklin said. "We took the long chance to get away from it, too, so we've got something in common. We, uh"—he looked about him—"like it here, great climate, ideal. I don't think any of us will want to move on. There seems to be plenty of room here, and it's unlikely that we would find another place just as good."

"But it's already been claimed!" Galvin made a stern effort to ignore the tall auburn-haired woman. "It's ours," he repeated doggedly. "It has been granted to us by divine authority, that here we may grow in harmony and in peace, and create a world of sublime simplicity, love and"—he glowered at them—"high moral integrity. Ours!" His voice rose. "We were here first, and this planet belongs to *us.* You and your sort cannot stay here—and that's final! You have to go!"

Broklin folded his arms. "I don't see why the rush. We're peace lovers, too, you know. We won't get in your way deliberately, you can rely on that, but as for an arbitrary order to depart, we'll have to discuss that amongst ourselves. I mean, way out here, and what we've been through already, you can't expect us to just . . ."

"You have to leave!" Galvin shouted, losing his patience. "The legal title is ours and you are interlopers."

The auburn-haired woman stopped eating her fruit for a moment in order to quiz dryly: "You could meet with our passive resis-

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tance—would you use force to throw us out bodily?"

Galvin goggled at her, involuntarily up and down, choked. "A week." He waved his fist. "I'll give you a week to leave. That should be ample time for you to align suitable coordinates and adjust your hiberstatic preparations. A week!" he cried, "and you'd better be gone by then, do you hear me?"

Abruptly turning his back, Humble Rector Galvin Khodpease thereupon broke the spell that had benumbed and glazed his cohorts. He gathered them up briskly and led them back to his flier.

Once upon a time space travel, if considered at all, was regarded as unrealizable, albeit at times amusing, fantasy. And then came airplanes. And then came larger and larger rockets. And then came satellites. And then came journeys to the local planets.

Initially, space vehicle and appurtenant costs were as astronomical as the field it was hoped one day to conquer. But some major developments—which were not always fully appreciated as such at the time—wrought significant changes in attitudes towards the general feasibility of celestial transportation. The cumulative knowledge, the spin-off, the end-result to disparate but related investigation, led to the greater continuing migration from Earth of live souls bound heavenwards than ever could have been imagined.

There was an odd element of seeming to do things backwards to arrive at what was to become familiar process. There was the space-shuttle program of orbital transporting vehicle retrieval and reuse. Separate and yet allied to this was research to formulate a space "lifeboat"—a life-support capsule, durable and shielding, that might return to base or home automatically and independently to its target, carrying astronauts to safety should their main craft be disabled.

Then came the photon drive, an engine compact of great practicality for space "lifeboats"—provided that escaping passengers could be kept alive for a necessarily protracted period while relative speed slowly, if unceasingly, climbed. Then came the hiberstat, the most efficient method for suspending animation ever discovered. And this hiberstat technique was polished into a Mark II series, and then to the Mark III, and so on to the Mark IV G, which theoretically—and verified experimentally—could arrest life indefinitely, barring accidents, to a reduction in aging factor of a negligible .3 to .7%—that was basing the subject-matter ratio upon the passage of one hundred years.

"It was rather a surprise contingency, eh?" their chief, Mallino, said. "Could have sworn we had the place to ourselves." He sampled another of the berry-type fruit that he and his foraging party had brought

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back. "Well at least it's encouraging to know that the first arrivals didn't perish from some untraceable complaint. Something of a relief, that."

"They must have found an even better place. Superficially they looked quite healthy, from what we could see," Broklin said. "Apparently they don't use radio or piccom, and from what I could make out, I'd say they were aiming to set up a simple, self-sufficient institution founded upon the old-fashioned verities."

"Yes. Jenny, could you pass me the sponge?"

A dark, olive-skinned young woman passed him a sponge, and he took it and wiped his sticky fingers. "Yes. And they were heavily clothed, you say?"

"They reminded me strangely of Puritans—you know, the ones from olden times. And their leader looked a bit like Abraham Lincoln. Yes, they were all in black, funny outfits, funny hats. That's what made me think they'd come from up north somewhere, somewhere cooler than here."

"Just so." Jenny passed Mallino a cloth to dry his fingers. "I see," Mallino noted with approval, "that you've discarded that bead waistband ornament, thank goodness. You did so before meeting those fellows, I hope?"

"Yes, I . . . well, I thought unmistakable solidarity was called for. I mean, we shouldn't let our differences about some minor decoration make outsiders curious, should we? And they were so stuffy that they made *me* feel cluttered."

"I'm glad. You were showing positive signs of backsliding, Brok. You realize that? Start by wearing a few bits of string, and soon you'd have us revert to dress and native primitivism, and so start off the terrible inhibitory cycle once again, with all the sequential conformism that that entails."

"It was only a little thing," Broklin protested mildly, "just for a touch of individuality, I thought."

"I understood, don't worry, but you must know that little things can lead to bigger things, as I told you at the time. Once wear a fig leaf and you might as well say that you have surrendered your freedom of body, and with it, your freedom of mind. Here we are Nature's children, have thrown off the shackles, at last, permanently. Sane and supremely civilized, here we can develop a society of unconscious natural charm, clear and pure without affectation, the epitome of ultimate cultural excellence."

Mallino posed, hand on hip. "And this archaic ban, they've given us a week to leave, have they?"

"That's what the man said."

"Did they give any hint that they were, uh, armed? That they could perhaps turn violent and nasty?"

"They didn't strike me that way. Nasty, yes; violent, no. Never can tell, of course, and it might not be wise to be careless."

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"No." Mallino reflected briefly. "Cheeky devils. It's typical of narrow-minded zealots to try and claim a whole world. A whole world! Isn't there more than enough room for everybody?"

"Ample," Broklin agreed. "We didn't find them, although we did look in the most likely places. And they must have gone out of their way to find us."

"So they must. A week, indeed. They must think that they own the whole place. Over-clothed, mentally-stunted medievalists, such fantastic claim to exclusive sovereignty almost surpasses belief. You're sure that they seemed unarmed?"

"As far as we could tell, nothing slick. And they didn't seem the type."

"Hm-m-m. Still, it won't do to take any chances. What an annoying intrusion upon our marvelous experiment. It seems incredible that after all our efforts, we should have to contend with some blathering nannies after all . . ."

"They are a blot, a scandal, upon the face of this fair and unspoiled world," Galvin Khodpease informed his brethren warmly. "Master Goodchap, Master Sagewick, and those other elders of our upper council who accompanied me, were shocked, nay, astounded beyond belief, by the vulgarity and absolutely shameless display of these depraved creatures."

"Humble Rector, sir, cannot we simply ignore these neo-primitives, and keep ourselves withdrawn from them?" one rugged-visaged matron asked. "The necessity for the first contact is to be regretted, and suggestion of any further engagement at a personal level, to any purpose whatsoever, is, to my mind, to be deplored. They are obviously deterministic heathens of a most pernicious and potentially corrupting kind."

"We cannot ignore them, Sister Janice," Galvin said. "Their presence is a menace to us. We cannot pretend that they are not there."

"But there are over one thousand miles and The Strait between us," Master Oldard ventured, "and from the account, their community is not large. They will not attempt to encroach upon us, surely? In their state, it should occupy them fully enough merely to maintain themselves where they are."

"I agree with Sister Janice," a Sister Welche interposed. "These newcomers are plainly retrogressives who have elected to take a path that will lead them inevitably to their doom. We should sever their very existence from our minds. They are far away, beyond any need or reason for us to know any form of association."

"They are a body on the way to perdition," Master Sagewick concurred. "They can safely be left to degenerate and destroy themselves in the wilderness."

"I wish I could be as sanguine that their material deterioration to van-

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ishing point was assured," Galvin's humor was tetchy, "but it is my experience that vice uncurtailed proliferates as a runaway disease. They have not, unfortunately, established themselves in a wilderness, but in that land of natural provision that we forswore, lest its ease should damn us with the curse of idleness and sloth."

"So *they* will degenerate, then," Master Oldard concluded.

Galvin was irritable. "There are certain humans of low form and deviant who may thrive excessively in such congenial conditions. Humans of this type confront us here. This world was pure, pure when we found it, and we must endeavor to keep it pure. We may consider it as a sacred trust."

Galvin said, "We cannot ignore these revolting people who have descended upon us. Certainly we could be strict in keeping ourselves apart. But surely, fatally, the day would come when their numbers would be such and their profanity and flagrant licentiousness so abundant, that they would overflow as fermenting scum, to taint, and soil, and swallow every hope for the future that we might cherish, every ambition for a strong, noble and God-fearing estate that we might hold dear. If they are allowed to take root, in that very area we had designated to preserve as reward to our aged and infirm, if they be allowed to firmly establish themselves, it is *they*, eventually, who will doom *us*, with the irresistible stench of their unconstraint and their mockery.

"No," Galvin was most positive, "for the sake of our children, and for our children's children, they *must* be persuaded to depart. They are as an evil serpent come upon us, and there is no place we may hide, no refuge where we may be assured safety in retreat. While they remain they pollute our atmosphere, and in the subversion of their introduced concepts they would ever threaten the communion and dedication of our Way. They *must* go . . ."

Computerized navigation by starfix was almost too easy.

The marriage of the various arts of progress and survival in space took the sharpest twist to consummation when the test-vehicle quartet of Bunch, Kraus, Witzlevy and Picker jumped the gun, overrode given instructions and set their space lifeboat out into the Milky Way, on a course to an undisclosed destination. Thus they changed a six-month space medicine sleep cruise into a voyage at once daring, romantic, and irresolvably mysterious.

It was the crazy stuff of dreams—all the more wondrous in that it was calculated and undertaken by sober and intelligent, knowledgeable and, hitherto, one hundred percent solid, reliable people—two girls and two boys. It was a simple combination in elopement to conjure fanciful musings and, betimes, a wistful envy of such seized opportunity. Escape to

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an absolute freedom, no ties, a breakaway from the cramped and importuning.

Their immunity in the exercise of their disobedience was cause for much cogitation and debate. They were gone, never to be heard of again. But they had established a precedent in enterprise. They would be the first people ever to leave the home solar system and actually travel to the stars. They would be the first to reach into the bursting treasure house of the galaxy. The coordinates for their return would be locked into their computer's memory, but tens, hundreds, thousands of years could pass before they might return. They would not be waked until they had reached their chosen goal—and if no satisfaction was there, what cost to move on? Somewhere . . . Somewhere they would find that which they sought, surely.

The exploit fired some minds with possibilities in a manner that conjectures of super-whizzings being ever Earth-mother-linked had not.

"We didn't come here to be dictated to by a bunch of ancient schoolmasters who pratice an outdated dogma of prudery," Mallino said. "It's stupid. We don't ask them to join in, do we? They can do what they like, please themselves. They chose to settle up north, that's their business, but trying to throw us out is taking the dog-in-the-manger a bit too far. Just imagine—they want to keep the whole place to themselves!"

"They're extremists," Jenny agreed. "It's difficult to conceive such a rigidity in thinking."

Mallino nodded. "True. They're limited, very limited. We haven't a prayer of reasoning with them, they're far too inflexible."

"Do you think they might try to use force?"

"They'd better not. We don't want to fight, heaven knows, but our whole liberty hinges on the honesty of the basic freedom of our self-expression. Artifice to concealment is to self-impose unwarranted stigma. To clothe is to acknowledge a shame that an advanced and sane culture must at once recognize as totally unfounded and illogical. We are here to enjoy and manifestly prove the superiority of elemental informality, and we cannot in the least submit to any contrary outside ruling, for to do so would negate every value we believe in. It's fundamental."

"So we'll fight?" Broklin said. He did not appear overly dismayed at the thought.

"More than anything, patently, peace is our motivation—but if they pigheadedly persist in their blind insistence, then yes," Mallino confessed. "Really, they will give us no choice . . ."

"They will give us no choice," Humble Rector Galvin Khodpease stated. "Their known condition, while they exist, will be an unremitting source to disturb. There is no

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knowing where their so-called 'free-thinking' will take them, and if we do not face them now and squash their pseudo-civilized paganism, then we may forget all our aspirations to create and maintain here a decent, clean-living standard, a way of life exceptional in its felicity."

"*I* am against the employment of force, Humble Rector," Master Sagewick wagged his head, "it is against all our principles. Respect and obedience for the laws gives us our blessed stability, and a conflict should not be of our seeking."

"Our wish, Master Sagewick, was and is indeed the pursuit of a high state that is attainable—attainable by men of vision and exemplary character. But our intent cannot be achieved if outside influences are allowed to interfere, outside influences which through perversity, unappreciation and callous indifference can assail our carefully constructed constitution with the corrosion of diverse and haphazard license."

"I still do not care much for the notion of obliging them to our bidding by force," Sagewick objected still.

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"Where they are deaf to our presented case, a physical clash must be regarded as unavoidable," Galvin observed with finality. "Where appeal to the finer sensibilities are to no avail, then there is no option but to correct and govern from strength. We owe this to our future generations, that they might have the chance to grow in a clean, sweet and considerate society."

"Just, ah, how far." Master Goodchap queried with some doubt, "and in what manner, do you think the application of force may be prosecuted?"

"Ah, yes, I have given this matter some thought. The most humane treatment, I feel now, might be for us to apprehend them and . . . but then . . ."

Dear, oh dear.

The Earth, as always, had its undesirables, its misfits, its forthright challengers and adventurers. The bustling Earth, as ever, more than ever, seemed to know irreconcilable strife and turmoil, a complexity that was added to rather than diminished

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by the resort of ever more brains to the multiplying problems.

To get away from it all. The determination of Bunch, Kraus, Witzlevy and Picker to journey independently to the design of their own initiative struck a chord too responsive to be dismissed as foolish aberration. Many years hence they would awake to a new orientation, new circumstance—they would be insulated from Earth by numberless years. They would be free people, clean, clean as it was possible to be, and fresh on an hitherto untouched scene.

Perhaps they were doomed. But they mightily stirred the minds of those they left behind. A new life. To look up at the stars was to be tempted.

"Naked savages!" one captured Junior Master bawled, purple with embarrassment. "Disgusting exhibitionists!"

The prisoners were stripped of their clothing, to subsequently be allowed a generous measure of freedom to wander if they so wished. However, the newcomers generally had no urge to wander far, and most huddled to be as inconspicuous as they might, or tried to hide behind one another. Most were without natural dark pigmentation, and were thus highly visible as new stock in the community. Having female guards keeping a motherly eye on them, and supplying them with food and unwanted conversation, had most of the prisoners fervently praying for salvation.

"They'll get used to it, and once familiarized, they'll see how ridiculous and unnecessary their imposed restrictions are."

"They're regular frightened rabbits," Broklin said. "They're so timid. I bet they even bathe in the dark at home."

"They'll get over it," Mallino was sure. "It's like shock-therapy, and they'll never be the same again. Once they get over it, have the rubbish and nonsense swept from their *minds*, they'll wake up, you'll see, and they won't *want* to go back to their old ways."

"Perhaps—*if* they recover."

"Yes," Mallino mused. "It's luckier for them to fall into our hands than for us to fall into theirs, I fancy. Brok, are you sure that the patrol that went out yesterday knew we were shifting our base camp here?"

"You may suit yourselves," Galvin Khodpease said grimly. "If you wish to discard your attire, then, of course, you may. On the other hand you may wish to don more, and for this, as you can see, you have a plentiful supply."

The mixed dozen of the enemy who had fallen into his hands hugged their overcoats to them and tried to look aloftly dignified, although already shivering and desiring to take advantage of the offer.

"The temperature doesn't often go below freezing, I understand, but is

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bracingly crisp all the year around. This part of the continent is quite hospitable, really, and with the tools and supplies we have left you, you should be able to look after yourselves quite nicely. You will have to *work*, of course, but we hope to be able to drop your friends nearby from time to time to give you a hand.

"For those of you who might wish to improve yourselves, this carton contains copies of our Good Book, plus all the powerfully ennobling literature that any man may require . . ."

The Junior Master's flushed face registered horror. "She got away, Provost," he panted. "She was all oily and I couldn't keep a grip on her."

"No, I couldn't hold onto the one I had, either. Vile animals, they're literally slippery." The Provost's nostrils flared. "And yours . . . did you say it was a female?"

"Yes, Provost, I . . . I . . . It was awful . . ."

"The brazen hussies," the Provost fumed, "depraved scarlet women!" He quivered to rising rage. "They are an abomination, a pestilence and a scourge upon us, the very embodiment of satanic malignity, attacking in strength, an unprecedented strength from fear, the fortress of righteousness that we would build in this place."

The Provost snorted. "Go wash the vile taint from yourself, my son. and then go and pray that your mind be cleansed also, and that our filthy enemy, our unspeakable enemy, may be delivered up unto us . . ."

Her version was different; she was ruffled. "He stuck his hands all over me, and I had a job to get away. He was like a starving man, and the way he clawed at me was terrible, totally uncontrolled. I just panicked, it was so grotesque."

"It's repression," Mallino opined. "They're indoctrinated with unnatural inhibitions, and so they naturally behave unnaturally and blow their fuses, where a more widely tolerant and rational person would be much more calm and resilient . . ."

"Technology unbridled, as we are only too well aware from our previous history, is to be deplored." The Humble Rector these days was a man under duress. "It had been my earnest hope and expectation that we would be free here to opt for only what usefully necessary equipment could be harmonized to simple living. But it seems we may be called upon to recollect skills we could wish to have forgotten in order to create means to subdue and eradicate these unconscionable outlaws."

"Their taunting of our punitive expeditions is nothing short of scandalous," Master Goodchap complained. "Their effect upon the morale of our younger members is not happy, Humble Rector, sir, not a happy one at all. They are being ex-

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posed to the most undesirable of circumstances, and the stress being placed upon them is most unfair."

"They should be able to withstand this test of their fortitude," Galvin said. "However, it *is* my mind that they should be given aid, what technological aid we may recall and temporarily concoct to assist them terminate the vicious impertinence of these invaders . . ."

"There's no hope for it," Mallino said, "we've got to expand our manufacturing and processing facilities." He gestured to the sky in exasperation. "We just want to be left alone to mind our own business, but will they let us alone? No. They have to travel over half a continent just to chivvy us about."

"It seems one hell of a shame that they should be pushing us into becoming an industrial society," the auburn-haired woman said. "I thought, in coming here, that assembly lines and automation-cranking would be minimum features merely to remind us of the scrambling past I thought we'd left behind."

"I know, I know how you feel, but

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what are we to do? Play hidey-go-seek forever? They need discouraging, and very sincerely. We can play games for a while, but then it starts to get tiresome. All *I* want is peace, but I'm getting heartily sick of this hunted feeling."

"There ought to be a law against it," the auburn-haired woman said. "Illegal harassment, it's not right, it's obviously not right."

Mallino wiped his face with his hands. "*I* know that—but how do we get through to Oliver Cromwell out there? We'll call the police, huh? How long will it take to get a message through and get them here? Three hundred sixty-two years? Oy." Mallino's eyes took an extreme diagonal, up. "And there's no saying they'd be on our side when they arrived—you know how they were when we left."

She was pensive. "It just doesn't seem right. Somebody should do something to clobber those jokers."

He sighed regretfully, "If we want these vault-packed blue-noses booted up the bum, we'll have to do it ourselves. It's a blasted nuisance, if you ask me, and my patience is just about exhausted . . ."

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On Earth it became generally conceded that a star needed planets to maintain its equilibrium. This postulated possible worlds in a quantity too enormous to grasp, and a mind was awed by the vision of the Elysian fields that might await the random visitor from the sky.

What had been an extravagant expense became much reduced in essentials. Space was found to be brought within the range of syndicates, and organizations, and sometimes subsidy from a government relieved to give heroes a glorious dispatch down the one-way avenue provided. First one party, and then another, came forward to volunteer, to propose, to find high authority to cooperate, to sponsor a venture to venues more than a lifetime away.

And, of course, if one government could take such action to favor and promote, then so might another not wish to appear uncharitable to a comparatively low-cost gamble that might, by virtue of bloodlines, place Portugal in an advantageous position at some date long in the future.

From a crowded Earth the exporting of such vanguard had blessing in serving many interests of defiance, boldness, glamour, and in that many cheered to depart in their cluster tanks were dreamers, idealists, and frustrated elements unable to find compatibility in the disorder of extant imperfect Earth systems.

And so the space lifeboat/shuttle became modified, and in their uncomplication put prior elaborate and ambitious concepts of space-voyaging to shame. They may have been described as coffins to convey the living dead, but Drake would have been proud.

"Now the cornered rats begin to show their true temper," Galvin Khodpease deduced aloud. "They would stoop to using arrows against us, to wound, and even to perhaps kill in an effort to deter us from lawfully claiming our own land. It seems that there are no depths to which they will not sink. Of all humanity, why should we have been afflicted with so coarse a breed as these?"

"It is, mayhap, God's will, Humble Rector," Master Oldard said. "The steadfastness of our faith is put on trial, with our suffering to reveal the quality of our mercy."

Galvin breathed deep and frowned. "We will show clemency and deal more than justly with these naked vagabonds, more justly than they deserve. As unrewarding as it may be, we must endeavor to teach them humility and modesty. Possibly one or two may be found to be not beyond rescue and the discovery of Grace." Galvin did not sound optimistic.

"They can ask no more than to be given a fair chance," Oldard admitted piously. "You do well, Humble Rector, sir, to remember the poverty of spirit they must needs know to be as they are. A person with lesser consciousness of responsibility would howl for death's blood."

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"You know not what torment I go through, Master Oldard, to curb the militaristic style that would seem to be being thrust upon us, so very much against our ardent desire. This flaunting outrage would goad us to distraction. They would in their flagrance remove freedom from us, by forcing us to blind ourselves, to shelter and protect ourselves from their obscenity."

"Galvin clasped his hands. "I pray to God to give me strength to withstand and control the terrible wrath they arouse within me. They are vandals, despoilers of an Eden that was provided for *us* . . ."

"Basically, what's their blubber?" Mallino asked. "I'll tell you," he answered, "we're in Eden and they're not. It's right here, but it's something the clot-heads pray to get after they're dead. For some cockeyed reason they can't accept it *now*. They're insane."

"At least they're keeping us fit," Broklin said. "Being kept on our toes has got us into good shape."

"Oh-ah—and what of those who couldn't run fast enough?" Mallino inquired. "Has there been any word about them? What did we get from our latest prize?"

"He confirms that they're not stringing us up. According to Marie, they've transported Goldie and Mick and some of the others to strand them some place on the Third Continent, like they've been telling us, to start a new life."

Mallino shook his head. "Screwballs. It defies comprehension, it really does. We've still had no luck tracking their flier?"

"Gangi should have his pickup tracer perfected shortly. With luck we should be able to follow their next night flights when they make them."

"I wish we could afford the scouts to make a full-scale search." Mallino said. "How's the puncher situation progressing? If we could keep them grounded for a while, maybe we could get some place."

"These things can't be rushed, Chief. The teams are doing as best they can—but we sure could use some of Mick's electronics know-how, though . . ."

"Exchange of prisoners?" Galvin cried, aghast. "They'd like us to free those we've caught?"

"In return for an equal number of ours, Humble Rector," Master Goodchap advised.

"Oh, yes? No! We're not doing any deals with those devils. It would be utterly senseless to start such a cycle. It would never end, Master Goodchap. Once begun, that sort of thing could go on and on, replenishing itself at the intervals the collections became large enough."

"But, sir, we must think of our own, what they must be going through at the hands of these . . . these . . . in constant . . . Humble Rector, it doesn't bear thinking about. The younger ones particularly

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could become permanently, irrevocably scarred."

"They know, do they not, the cause that they fight? Do you think the faith of our members is so weak that they will succumb to such pitiful onslaught?"

Master Goodchap made no reply, so giving Galvin pause to reconsider the matter.

Then Galvin smote his palm. "Damn these filthy swine and the wretched habits they forcefully impose. Such disgusting behavior is a crime, a loathsome offense before the eyes of God and man. There can be no forgiveness for the deliberate corruption of the innocent, especially the young."

"No, Humble Rector."

Galvin faced his dilemma. He pressed his palms together, scowling. "Our artifacts, our countermeasures and hunting instruments—there is continuing advancement in their fashioning?"

"As well as can be expected, Humble Rector, sir. We should be able to conduct some field tests on schedule."

Galvin wrenched his hands apart. "Damn it! Very well then," he snarled, "for this once we may engage them in mutual repatriation. But let us see to it that soon thereafter the superiority of our devised equipment will enable us to arrest them in crippling numbers . . ."

"I can understand three of theirs wanting to defect to us, but I can't for the life of me see why two of ours should wish to defect to them," Mallino said. "I just don't believe it. They must have used some powerful coercion."

"No," Mick assured him, "they just wanted to. They asked to stay."

"But why? What for?"

Mick shrugged. "I don't know. I suppose there's something about an indestructibly rigid format that duffs for security. Some people are kinky enough to find it attractive."

"I'm glad you weren't one, we want you back here. Hm-m-m. Well it's nice to know that in swaps freedom would seem to have a fifty percent edge in preference."

"My preference was for climate," Mike said. "I'd have taken any place that was warm after that hellish chill, even if it meant going around in a Mother Hubbard."

"Don't say that! That's the kind of talk that leads straight to capitulation. Take one backward step, make an excuse to relinquish one vital liberty, and the consequence is descent into shallowness, pettiness, false values and hypocrisy. Never forget that. It is a crucial condition of our happiness."

"Yes," Mick said placatingly, "sure, Chief, sure . . ."

"They've done what? Shot down one of our fliers? *Shot* down? Great heavens . . ."

"It was an ambush, and suddenly the place was full of this sticky,

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string-like stuff, and then with clouds of this downy confetti going off everywhere. I was on the fringe and managed to break away, but the others . . ."

"That's right, sir, they found Camp Three, it seems, and they've managed to lift off over half of the prisoners we had there . . ."

"Keep your fire low, fellows, if you possibly can. If they no runnee, they no catchee . . ."

"Pay particular attention always to the wind direction, and lob the canisters accordingly. Whatever you do, don't remove your masks until the last captive has been strapped into a blanket, and only then after one of you has made tests to make quite sure that dispersal . . ."

"There we are, one hundred thousand assorted leaflet flims to supplement their meager literary diet. If the words don't get them, then the pictures will. It's a pity they're still restricting radio to their military business . . ."

Things were warming nicely, the forces of Good ranging against the forces of Evil in a manner most convenient to whichever side a protagonist happened to belong.

But the picture was not yet complete, and there was still something missing. This part, to remedy such absence that might be felt, was providentially shortly supplied. And before long the warring factions gleaned news and information and made discovery that another was nigh upon them, to make three a crowd.

"Wouldn't you know it?" Mallino threw up his hands. "All right, so the hossanah hooters have been a damned pest, but they've only been chasing us with bloomers. That's it, in essence. But this new lot, they're a different bundle of crud peddlers altogether.

"Oh my word," his head sank as he put his fists up by his ears, "why here? There must be millions of other places. We were promised that we could found our own society here, monsters permitting, and with the odds against seeing any other humans for a millennia being so remote as to be not worth considering. So how come we not only have Holy Harry and his boys, as if that's not enough, but now plopping in like they have reserved seats, this mob putting up its big-top on the Second Continent?"

"I've been thinking about that," Broklin said. "It could be the long-distance navigational selector being too good in picking out the best sun to compare with the one at home. It could tend to shorten the odds over a certain launching arc."

"Oh great, dandy." Mallino flapped a hand. "So what do we do now? They'll gang up on us for sure . . ."

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But the Humble Rector Galvin Khodpease and his Merry Men were not of the least mind to woo the latest arrivals for an ally. To the contrary, these well-meaning fellows burdened with good intentions were most discommoded to learn the nature of the latest uninvited tenants to *their* world.

"This is insufferable. They must be programming them to this spot on purpose. It's . . . It's criminal thoughtlessness, criminal carelessness, criminal negligence." Galvin agitatedly paced. "It's too much, it's not fair. We were most explicitly assured before departure that we alone would pioneer our new world, freely as circumstances permitted, to build unhindered a global community in common bond of brotherhood and understanding."

Galvin flung out a handful of spread fingers. "Now this. I cannot condone the willful defiance of the unclothed shortsighted–but *they* are as children, ultimately, certainly, to be taught their lesson, and possibly to be assimilated and properly educated. But these new people, they bring a godless negation and a proven belligerence towards any who would differ from them. They will probably dupe the foolish nature-lovers by offering to join them against us. Their type are masters at such a deceitful ploy . . ."

There was uneasy recognition of a need to conserve resource and share talent. There was much girding of loins, a temporary truce between the two original contestants, and an unlikely but jointly agreed approach to the newest visitors, to bluntly request them to clear off. The world had already been claimed, and these fresh fellows were cordially invited to betake themselves elsewhere, to as fine unoccupied and unclaimed real estate that beyond question awaited the explorer in the bountiful heavens. There was plenty, and the choice surely infinite, and there was no *need* for these emigrants to remain, to stay, plainly, regrettably, unavoidably only to cause friction with the established owners.

"We," the older residents declaimed stoutly, "were here *first*!"

The new group responded not with deference or apology, but with an aggravating unhurry that telegraphed their intended fixity. Their reply, when it came, was couched in sugary terms of professed friendship, but giving no hint at all that re-embarkation was imminent, or even being contemplated.

"Comrades, to you we extend our warmest greetings and we endorse your wishes for peaceful coexistence, that we may enjoy this glorious world with you and live together in lasting goodwill.

"We shall respect your joint possession of your continent, as we are sure you will respect our possession of ours. Later we hope to peacefully discuss the division of the Great Northern Land, to where you seem

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already to have removed certain dissidents in your communities. It would be wise, we think, to have more positive control over the productive capacity of these outcasts.

"There is, we have learned, an unfortunate difference of opinion between your two regimes. Here we would be prepared to offer our services as mediator, for we are very distressed that there should be such bitterness in so broad and fruitful a land. At the same time we must stress that we cannot stand idly by while imperialistic soldiers wantonly attempt to crush the free expression of our worker-nudist comrades. We may trust that we may achieve an agreeable understanding between the combatants, and that we shall not be forced to intervene and to supply troops as a deterrent to avaricious aggressors.

"At the outset let it be clearly known that we will not tolerate warmongering, nor will we see an underdeveloped people exploited. Chairman Zole warns that we are not unprepared to retaliate should there be any undeclared act of war against *us*, and any would-be enemy of The Peoples Republic of New Albania is hereby urged to redefine and purify their ambitions . . ."

"Underdeveloped worker-nudists?" Mallino exploded. "What's he talking about? Our least citizen has got more brains than Old King Zole."

And to the north some ways Humble Rector Galvin Khodpease was of somewhat like mind. "That does it. Upstarts. The nerve of those people. One way or another, separately or in bulk, *these* we *have* to get rid of. The whole Second Continent indeed! And kindly giving us permission to retain a little corner all to ourselves! The nerve! Division of the North Land! Why . . ."

The effrontery rendered him speechless.

On the new world there was now plenty to do. There was contention, argument and dispute, alliances of expedience, plot, intrigue, counterplot, physical clashes, verbal battles, fierce technological competition in the juggling and management of the resource/capability/priority juxtapositions. There were rude words, denunciations, propaganda blastings—in short there was action, spur to keen alertness, and more than enough at stake to occupy a mind to staunch purpose.

It had become a *live* world. The Program Moderator could chalk another victory to his score. He had created another Utopia. ■

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1	Wheels Within Wheels	*F. Paul Wilson*	1.92
2	The Fine Print	*John T. Phillifent*	2.41
3	The Lion Game (Conc.)	*James H. Schmitz*	2.57
4	Knight Arrant	*Jack Wodhams*	3.44
5	To Make A New Neanderthal	*W. Macfarlane*	4.55

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Just Peace

When war is a century-old tradition—
how can you bring about essential cooperation?
Teddy Roosevelt had a valid answer . . .

WILLIAM RUPP and VERNOR VINGE

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In its orbit about Jupiter, an artificial star flickered briefly, its essence oscillating between matter and energy. The complex disturbance generated by those pulsations spread out from the Solar System—in violation of several classical theories of simultaneity—at many times the speed of light.

Nineteen light-years away, a receiver on the second planet of the star delta Pavonis picked the signal out from the universal static of ultrawave radiation and . . .

Chente felt a slight, though abrupt, lurch as gravity fell to New Canadian normal. That was the only sign that the transmission had been accomplished. The cage's lights didn't even flicker.

("We can't know, of course, the exact conditions which faced your predecessor. His report is eighteen months overdue, however, so that we must expect the worst.")

Chente took a deep breath and stood, feeling for the moment exaltation: three times before he had sat in the transmission cage, and each time he had been disappointed.

(". . . Believe you are ready, Chente. What can I say to a man about to travel nineteen light-years in an instant? For that matter, what will I say to the man who remains behind?")

The exit was behind his chair. Chente hit the control plate, and the hatch slid silently into the wall. Beyond was the control cubby of a ramscoop starship. Chente scrambled through the opening and stood in the small space behind the control saddle. The displays were all computer driven, and rather quaint. Neat lettering above one of the consoles read: INTERNATIONAL BUSINESS MACHINES OF CANADA—the original Canada back on Earth. Chente had spent hundreds of hours working out in a mock-up of this famous control room, but the real thing was subtly different. Here the air felt completely dead, sterile. The mock-up on Earth had been occupied by occasional technicians, whereas no one but Chente's predecessor had been in this room for more than a century. And it had been more than three centuries since the robot craft had sailed out of the Solar System.

A monument to empires passed, Chente thought as he slipped onto the saddle.

"Who goes there?" a voice asked in English.

Chente looked at the computer's video pickup. He had had plenty of practice with a similar think-box on Earth: the mech was barely sentient, but the best mankind could produce in the old days. Chente's superiors had theorized that after three hundred twenty years such a brain would be more than a little irrational. The human responded carefully, "Vicente Quintero y Jualeiro, agent of the Canadian Hegemony." He placed his ID before the pickup. Of course it was a fake—the Canadian Hegemony had ceased to exist

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one hundred years earlier. But the computer probably wouldn't accept any more recent authority.

"I have already received Vicente Quintero y Jualeiro."

It really is senile, thought Chente. "That is so. But another copy of Quintero remains on Earth, and was used for this latest transmission."

A long pause. "Very well, sir, I am at your disposal. I so rarely receive visitors, I—You require a situation report, of course." The vocoder's pleasant baritone assumed a sing-song tone, as if repeating some long-considered excuse. "After my successful landing on delta Pavonis II, I sent Earth a favorable report on the planet— Sir, most pertinent criteria *were* favorable. I see now my mistake . . . but it would have taken a new program to avoid making it. Shortly thereafter I received an initial transmission of fifteen hundred colonists together with enough ova and sperm to breed a colony. By 2220, the New Canada colony had a population of 8,250,000.

"Then . . . then the great planetary disturbance occurred."

Chente held up his hand. "Please. The Hegemony received your reports through 2240. We've reestablished contact to find out what's happened since then."

"Yes, sir. But I must report all the truth first. I wish no one to say that I have failed. I warned of the core collapse several weeks before it occurred. Yet still, most of the colony was destroyed. The disruption was so great, in fact, that the very continental outlines were changed.

"Sir, I have done my best to help the survivors, but their descendants have regressed terribly, have even formed warring nation-states. These groups covet every fragment of surviving technology. They stole my communication bombs so that I could no longer report to Earth. They have even attacked my own person, and attempted to cannibalize me. Fortunately my defenses are—" The computer broke off, and remained silent.

"What's the matter?"

"A small party is now climbing the hill I stand upon."

"Do they look hostile?"

"They are always hostile toward me, but this group is not armed. I suspect they saw the coronal discharge that accompanied your arrival. They probably drove here from Freetown."

"A city?" said Chente.

"Yes, a city-state which has remained neutral in the current warfare. It's built over the ruins of Firstlanding, the settlement I helped to found. Would you like to see our visitors?"

Chente leaned forward. "Of course!"

A large screen lit up to show a grass-covered slope. Coming up the hill toward the ship were twelve men and a woman. Beyond them, beyond the hill, the ocean stretched away unbroken to the horizon.

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"Madre de Dios!" Chente gasped. On the old maps this hilltop was 3,500 kilometers inland. The continental outlines certainly had been changed by the catastrophe.

"Say again, sir?" said the computer.

"Never mind." Chente ignored the view and concentrated on the people who would soon be questioning him.

They made an interesting study in contrasts. To the left, a man and woman walked almost in lock step, though they remained discreetly apart. The man was dressed in simple black trousers and a short coat. His hat was stiff and wide-brimmed. The woman wore a long black dress that revealed nothing of her form below the neck. Her reddish hair was drawn back and tied with a black ribbon, and her grim face showed no sign of makeup. The two short men in the center wore jumpsuits, apparently modeled after the original colonists' dress. To the right, eight nearly naked men bent beneath an elaborate litter carrying a young male. As the group stopped, the litter was lowered, and he stepped jauntily to earth. The fellow's upper body was heavily oiled. He wore skin-tight breeches with an enormous codpiece. The grimly dressed couple on the left looked straight ahead, trying to avoid the sight of their companion on the far right.

"You see the cultural fragmentation that has occurred here on New Canada," the computer remarked.

"How far are they now?"

"Twenty meters."

"I may as well meet them. Offload the equipment that came through with me."

"Yes, sir." A hatch slid open and he entered the air lock beyond. Seconds later he was standing ankle-deep in turquoise grass, beneath a pale, pale blue sky. A slow breeze pushed with remarkable force against his jumpsuit: sea level air pressure on New Canada was almost twice Earth's. He was about to greet his visitors when the somber woman spoke, her voice tense with surprise.

"Chente!"

Chente bowed. "You have the advantage of me, ma'am. I take it you know my predecessor."

"The past tense would be more appropriate, Freeman Quintero. Your twin was murdered more than a year ago," the fellow in the skin-tight pants said and smiled at the woman. Chente saw that in spite of his athletic build and flamboyant dress, the man was in his forties. The woman, on the other hand, seemed much younger than she had at a distance. Now she kept silent, but her companion said, "It was one of *your* ships he died on, you slave-holding animal." The shirtless dandy just shrugged.

"Please, gentlemen." The fat man in the center spoke up. "Recall that the condition of your presence here requires a certain mutual cordial-

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ity"—glares flickered back and forth between Shirtless and the puritans—"or at least courtesy. Mr. Quintero, I am Bretaign Flaggon, mayor of Freetown and governor of Wundlich Island. Welcome.

"The lady is Citizeness Martha Blount, ambassadress to Wundlich from the Commonwealth of New Providence, and," he rushed on as if trying to make both the introductions at once, "this gentleman is Bossman Pier Balquirth, Ambassador to Wundlich from the Ontarian Confederacy."

The woman seemed to have recovered from her initial surprise. Now she spoke with solemn formality. "New Providence regards you as our honored guest and citizen. Our nation awaits your—"

"Not so fast, Mistress Blount," Bossman Pier interrupted. "You aren't the only people brimming over with hospitality. I believe Freeman Quintero would be much more comfortable in a society which does not condemn dancing and music as a crime against nature."

"Please!" Flaggon repeated, "let's not have propaganda spoil the arrival of a visitor from the Mother World. As mayor, I wish to offer you any assistance you require, Mr. Quintero. I, uh . . . *Ah*! I will hold a banquet in your honor tonight. Of course, we will invite guests from both New Providence and Ontario." He sighed unhappily, recognizing the inevitable. "You can settle things then."

A faint hissing announced the opening of the freight port in the ship's hull. A lift slid down the ancient metal surface with Chente's "luggage."

"Mr. Quintero y Jualeiro," the computer's vocoder boomed from a hidden speaker, "have you further orders at this time?"

"No. I will keep in touch."

"Beyond this hill I cannot protect you, sir."

"I'll survive."

"Yes, sir," doubtfully.

"Damned machine," Bossman Pier said softly. His perpetual grin had vanished. "It should be helping us. Instead it shoots at anyone trying to make entrance. We had to leave most of our boys at the base of the hill or we couldn't have got this close. Can I help you with that equipment?"

Chente stepped between Balquirth's servants and the freight lift.

"No thanks. I can carry it myself."

The Ontarian smiled knowingly. "Perhaps you will survive, after all."

As they walked down the hillside, Vicente kept silent. *So I died here*, he thought. Well, that was no great surprise. But that he had been killed by the very colonists he had been sent to help made his mission seem doubly difficult. What had happened on New Canada these last one hundred thirty years?

The lush grass on the hilltop thrived everywhere. He was no botanist, but it looked like some terrestrial type brought by the first colo-

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nists. Other vegetation was less familiar. Large ferns and broad-leafed plants stood in scattered clumps. The trees looked like giant flowers: their trunks rose straight and tall, with purple foliage sprouting from the top. Except for the grass, the land had a strong Permian aspect. Chente half expected a giant reptile to pop out of the bushes.

They had reached the base of the hill when his expectation materialized. A meter-wide *something* flew low over their heads, then circled above a nearby ridge.

"A gretch," Bretaign Flaggon said. "They're really quite common around here. That poor little fellow must have lost his mother."

The "poor little fellow" looked like a cross between a pterodactyl and a buzzard. Chente grimaced. A nice place for a lifelong vacation. He'd never cared for paleontology.

At the base of the hill they stopped by a large three-wheeled vehicle and a group of armed men with bicycles. The powered tricycle was driven from a bench above and behind the passenger compartment. A brass tank and a piston cylinder sat below the driver's seat.

"Steamer?" Vicente asked, as he climbed into the cab.

"Quite right," Balquirth said. He swung up onto his slave-powered litter and looked down at Quintero. "If you're wise, you'll use something time-tested." He patted the satin pillows.

Flaggon and his driver climbed onto the upper bench, while Martha Blount and her aide got in with Chente. The armed bicyclists started down the road, and the auto got off with a jerk and a jump. The deep cushions could not disguise the absence of an adequate suspension, and acrid black smoke drifted from the fire box into the passenger compartment. Behind them, Bossman Pier's bearers were having no trouble keeping pace.

Minutes later the auto was puffing down a long slope that gave an overview of Freetown. The city was built around a crescent-shaped bay protected on the north by a huge granitic outcropping. Except for that headland the bay was open to the sea.

"Have many storms?" he said to Martha.

"Dreadful ones," the woman answered, unsmiling. "But the tsunamis are worse—that's why the ships you see are anchored so far out. They come in to port only for loading."

The city rested on a sequence of terraces that climbed steeply up from the water's edge. Each terrace was split down the middle by a narrow, copper-paved street, while steps and coppered ramps provided communication between one level and the next.

Chente noticed that on the first three tiers the buildings were mostly warehouses and sheds. Nearly all these structures were made of wood

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and had a brand-new look. But above the third tier, the buildings were of massive stone construction, eroded and weatherbeaten. The most peculiar thing about the stone buildings was their long, narrow shape, their sharp, pointed ends. The prows of these stone arcs pointed uniformly out to sea.

Martha Blount followed his gaze. "The Freetowners use those wooden buildings for temporary storage of sea freight. They can count on everything in the first three terraces being leveled every two years or so. Beyond the third level, the tsunamis attenuate and the water breaks over the bows of the buildings."

The auto turned onto the fourth tier's main street, and slowed even further to get through the swarm of Freetowners moving to and from the stone-encased bazaars.

Chente shook his head in wonder. "You people certainly have managed to adapt."

"Adapt!" The New Providencian ambassadress turned toward him, for the first time showing an emotion: rage. "We were nearly wiped out in the Cataclysm. That computer-driven monster up there on the hill gave us a real prize. With an advanced technology a colony on this planet could get along, but with that technology lost the place is a Hell. Adapt? Look—" She pointed out of the cab. They were passing near the edge of the terrace now, by blocks of gray rubble, stumpy walls. "Life on New Canada is a constant struggle simply to maintain ourselves. And all the while we're weighed down by those sybarites." She waved her hand back toward Bossman Pier's litter, some fifteen meters away. "They drain our resources. They fight us at every turn . . ." Her voice trailed off and she sat looking at Chente. For a moment some new emotion flickered across her face, but then she became impassive. Chente suddenly realized the reason for her silence: it was the second time around for Martha. No doubt she had sat in this same vehicle eighteen months earlier, and had had the same conversation with his predecessor.

Martha's hand moved toward him, then retreated. She said softly, "You really are Chente . . . alive again." Her tone became businesslike. "Be more careful, this time, will you please? Your knowledge, your equipment . . . many people would kill to get them." She was silent the rest of the way into town.

At sunset the heavy layers of dust in New Canada's atmosphere transformed the pale-blue sky into orange, red, and greenish brown. From where Chente sat within the Freetown banquet hall, the sky light shone through narrow, horizontal slits cut high up in the west wall to play gentle pastels of orange and green down upon the waiters and chattering guests. It was a most colorful tribute to volcanism.

The sky light faded slowly toward gray as the last unpleasant course of

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the meal was served. Above them, electric lamps mounted on large silver wheels were lit. Clusters of rubies and emeralds hung like clouds of colored stars around the glowing filaments. Occasionally the earth trembled faintly, causing the wheels to sway as if a slight breeze had touched them.

The meal over, Bretaign Flaggon rose to deliver "a few words of welcome to our star-crossed [sic] visitor." Chente couldn't decide whether the phrase was a pun or a malaprop. The speech droned on and eventually the Earthman succeeded in ignoring it.

The hall's wide floor was covered from wall to wall with what could only be gold. The soft yellow metal behaved like some slow sea beneath the weight of the banquet tables and constant passage of human feet: tiny ripples barely a centimeter high stood frozen in its surface. New Canada had everything the Spanish Conquistadores had ever dreamed of. But this virtue was symtomatic of a serious vice. Heavy metals were plentiful near the planet's surface simply because New Canada's interior was much more poorly differentiated than Earth's. The starship's computer had reported this fact to its makers on first landing here, but had failed to notice that the process of core formation was ongoing. The cataclysm that hit the colony one hundred fifty years earlier was evidence of this continuing process. The abundance of metallic salts on the surface meant that less than one percent of New Canada's land area could be used for farming. And those same salts made the sea life uniformly poisonous. In contrast to the opulent banquet hall, the food served had been scarcely more than a spicy gruel.

". . . Mr. Quintero." Applause sounded as Flaggon finished talking. The mayor motioned for Chente to rise and speak. The Earthman stood and bowed briefly. The applause was equally enthusiastic from the three groups seated at the horseshoe banquet table. On his right sat the Ontarian delegation, consisting of Bossman Pier, three associates, and a crowd of scantily dressed odalisques—all ensconced on piles of wide, deep pillows. Chente had been placed at the middle of the horseshoe with the Freetowners, while Martha Blount and her people sat along the left leg of the horseshoe. All through the meal, while the Ontarians caroused and the Freetowners chattered, the New Providencians had kept silent.

Finally the applause died, and people waited. From above them the tiny lights burned fiercely, but the stark shadows they cast held abysmal gloom. Chente saw a certain measure of fear in their attentive silence. No doubt many of them had sat right here less than two years before, and watched a man identical to the one they saw now. Intellectually they might accept the idea of duplicative transport, but historians had assured

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Chente that without a lifetime of experience no one could really accept such a thing. To his audience Chente was a man come back from the dead. Perhaps he could take advantage of this fear.

"I will be brief, as most of you will have heard this speech before." There was an uneasy movement and various exchanges of glances. Bossman Pier seemed the only one left with a smile on his face. "Your planet is undergoing a core collapse. A century ago a core tremor sank half a continent and virtually destroyed your civilization. Recently Earth has been able to reestablish communications with the starship on the hill behind Freetown. The link we have established is a tenuous one and you can't expect material aid. But Earth does have knowledge it can place at your disposal. Ultimately the core collapse will proceed to completion, and about ten million 'Cataclysms' worth of energy will be released. If this happens all at once, no life above the microbe level will be left on the planet. But, if it happens uniformly over a million-year period, you would never even be aware of the change. From the frequency of earthquakes, you know that the latter possibility has already been ruled out. My mission is to discover where between these two extremes the truth lies. For it is entirely possible that a future Cataclysm will be powerful enough to wreck your civilization as it is now, yet mild enough so that with adequate forewarning and preparation you can survive."

Flaggon bobbed his head. "We understand, sir. And, as we did with your predecessor, we will cooperate to the limit of our resources."

Chente decided to pounce on the double meaning in Flaggon's inept phrasing. "Yes, I've heard about the splendid help you gave my predecessor. He is dead, I've been told." He waved down Flaggon's stammered clarification. "Ladies and gentlemen, someone among you killed me. That was an act that threatened all of New Canada. If I am killed again, there may be no more replacements, and you will face the core collapse in ignorance." Chente wondered briefly if he hadn't just invited his assassination with that last threat, but it was too late to retract it.

The distressed Flaggon again pledged his help. Both Balquirth and Martha Blount chorused similar promises.

"Very well. I'll need transportation for an initial survey. From my discussion with the ship's computer before this banquet, I've decided that the best place to start is the islands that were formerly the peaks of the Heavenraker Mountains."

Martha Blount came to her feet. "Citizen Quintero, one of our Navy's finest dirigibles is tied down here at Freetown. We could be ready to go in twenty-two hours, and it won't take more than another day to reach

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the Heavenraker Islands." On the other side of the horseshoe, Balquirth cleared his throat noisily and stood up. Martha Blount rushed on. "Don't . . . don't make the same mistake the first Quintero did. He accepted Ontarian hospitality rather than ours, only to die on an Ontarian ship."

Chente looked at the Bossman.

"Her story is true, but misleading," Balquirth said easily. He had the air of someone telling a lie that he expected no one to believe—or else a self-evident truth that needed no earnest protestations to support itself. "The first Quintero had the good judgment to use Ontarian transportation. But his death occurred when the ship we assigned him was attacked by the forces of some other state." He looked innocently across the table at Martha Blount.

The Earthman didn't respond directly. "Mayor Flaggon, what's the weather like along the Heavenraker chain this time of year?"

The mayor looked to an aide, who said, "In late spring? Well, there are no hurricanes likely. Matter of fact, the Heavenrakers rarely get any bad storms. But the underground 'weather' is something else again. Freetown alone loses three or four ships a year out there—smashed by tsunamis as they sail close to shore."

"In that case I'd prefer to go by aircraft."

Balquirth shrugged amiably. "Then I must leave you to the clutches of Mistress Blount. I don't have a single flier in port, and Mayor Flaggon doesn't have a single flier in his state."

"Your concern is appreciated in any case, Bossman. Citizen Blount, I'd like to discuss my plans in more detail with your people."

"Tomorrow?" She seemed close to a triumphant smile.

"Fine." Vicente began to sit down, then straightened. "One more thing. According to the starship's computer, all nine communications bombs are missing from their storage racks up on the hill."

In order to generate ultrawave distortions matter must needs be annihilated. Chente referred to the specially constructed nuclear bombs whose detonation could be modulated to carry information at superlight speeds. Such devices lacked the "bandwidth" to transmit the pattern of a human being—Earth's government used the tiny star that orbited Jupiter where Callisto had once been for that job. Nevertheless, each of the communication bombs could be set to generate the equivalent of ten megatons of TNT, so they could do considerable damage if they were not hoisted into space prior to use.

The silence lengthened. Finally Chente said coldly, "I see. Your nation-states are playing strategic deterrence. That's a dangerous game, you recall. It cost Earth more than three hundred million lives a few centuries back. Your colony is in enough trouble without it."

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His listeners nodded their agreement, but Chente saw—with a sick feeling—that his words were no more than platitudes to them.

The New Providencian airship *Diligence* flew south for a day and a half before it reached the first of the Heavenrakers. Chente saw a small village and a few farms in a sheltered bay near the coast, but the rest of the island was naked black rock. This was the first stop on a tour that would take them over 2,700 kilometers to the East Fragge, the Greenland-sized island that had once been the eastern end of the largest New Canadian continent. Chente had chosen this course since he wanted a baseline of observations along the planet's equator, and the Heavenrakers were the most convenient landmasses stretching along such a path. The survey went quickly, thanks to the help of the islanders, though they seemed happy only when the *Diligence* and its guns were preparing to depart.

Three days later the dirigible hung in the clear blue sky over the west coast of the Fragge. All around them thunder sounded. For hundreds of kilometers along the coast they could see tiny rivulets of cherry-colored molten rock dribbling off into the surf, converting the water into a low-lying fog beneath them. Looking inland at the extent of the frozen lava, Chente could see that the land-forming process had added thousands of square kilometers to the area.

Quintero turned to his companion at the railing. Martha Blount hadn't really changed in these last four days, but she had been revealed in a new aspect. For one thing, she had traded her full-length dress for a gray jumpsuit that covered her but hinted at a lot more than the dress had. From their discussions on the journey out he had found her to have a quick and lively mind that belied her outward reserve and convinced him that she had earned her high position. At times he found her interest in his equipment and plans somewhat too intense, and her political views too rigid, but he knew better than to expect anything else under the circumstances. And the more he knew of her, the more certain he was that her presence here was not motivated strictly by political interest: there had been something between Martha and the first Chente.

He gestured at the red and black landscape shimmering in the superheated air below them. "Are you sure you still want to come down with my landing party?"

She nodded. "I certainly do. It's not as dangerous as it looks. We'll be going many kilometers inland before we set down. I'm—doing a little reconnaissance here myself. I've never been in this part of the world."

Further conversation became impossible as the nuclear jets lit up to angle the *Diligence* down toward the black ridges that thrust up between the rivulets of fire. The jets were just

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one of many anachronisms in the New Providencian military machine. Apparently they had been salvaged from one of the colony's original helicopters. With them, the dirigible could make nearly fifty kilometers per hour in level flight.

The *Diligence* flew inland until the ground below was solid and cold. The airship descended rapidly, then leveled off just before its nose skid rasped across the jagged volcanic slag. Heavy grapnels were thrown out and the ship was drawn to Earth.

Vicente called to Ship's Captain Oswald, "Who'll be in charge of my ground party?"

"Flight Corporal Nord," the officer said, pointing to a tall, muscular man, who together with three other men was dragging explosives and equipment out of the *Diligence*'s cramped hold. "We'll stay on the ground just long enough to drop you off, Citizen Quintero. We're at the mercy of every breeze down here. We'll come back for you in twenty-two hours, unless you signal us earlier." He glanced at Martha. "Citizen Blount, I suggest you forego this landing. The country is pretty rough."

Martha looked back at him, and seemed faintly annoyed. "No, I insist."

Oswald frowned, but did not press the matter. "Very well. See you in a day or so."

Nord and two of the riflemen were the first to hit ground. Martha followed them. Then came Vicente, loaded down with his own special equipment. Two more riflemen with the explosives brought up the rear.

The landing site was a flat area at the top of a narrow ridge. The seven of them clambered down the hillside as the huge aircraft's engines throttled up. By the time they reached the bottom of the ravine that followed the ridge, the *Diligence* was already floating five hundred meters over their heads.

"Let's follow this gorge inland a bit," said Quintero. "From what I could see before we landed, it should widen out to where we can do some blasting without risking an avalanche."

"Anything you say," Nord replied indifferently. Chente watched the man silently as the other moved on ahead. One way or another, this would not be a routine exploration.

The New Providencians spent most of the afternoon setting off explosives in the slag. Their firecrackers were bulky and heavy, and the work went slowly. The bombs didn't amount to more than half a ton of TNT, a microscopically small charge to obtain any information about conditions within the planet. Fortunately Chente's instruments didn't measure mechanical vibrations as such, but considerably more subtle effects. Even so he had to rely on coincidence counters and considerable statistical analysis to derive a picture of what went on hundreds of kilometers below.

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Toward evening the sky became overcast and it began to drizzle. Chente called off their work. In fact, his survey was now complete, and his grim conclusions were beyond doubt. A stiff breeze kept anyone from suggesting that they call down the *Diligence.* Even with perfect visibility, Oswald probably couldn't have brought the airship in against that wind.

By the time they set up camp in a deep hollow—almost a cave—beneath the cliff face, they were all thoroughly soaked. Nord put two of his men on watch at the entrance to the hollow, and the rest of the party took to their sleeping bags.

As the hours passed, the rain fell more heavily, and from the west the steady hissing of the lava masked nearly all other sounds. Abruptly, the cylinder that rested in Chente's hand vibrated against his palm: someone was tempering with his equipment. Chente raised his head and looked about the cavelet. The darkness was complete. He couldn't even see the sleeping bag he lay in. But now the years of training paid off: Chente relaxed, suppressed all background noise and listened for nearby sounds. There! At least one person was standing in his immediate vicinity. The fellow's breathing was shallow, excited, Farther away, toward the equipment cache, he could now hear even fainter sounds.

Quintero slipped quietly out of the sleeping bag which he had prudently left unbuttoned and moved toward the cavelet entrance, lifting and lowering his feet precisely to avoid the irregularities he remembered in the rocky ground. He probably would have got clear anyway, as the distant hissing and the sound of rain covered whatever sounds he made. He didn't dare pick up any equipment, however; he was forced to settle on what he'd kept with him.

Twenty meters out into the rain, he turned and lay down behind a small, sharp hummock of lava. He drew his tiny pistol. Several minutes passed. These were the most cautious assassins he had ever seen. As if to rebut the thought, two of the guards' hand torches lit. Their yellow beams shone down upon his and Martha's sleeping bags. The two other guards held their rifles trained on the bags, ready to fusillade.

Before the riflemen could utter more than gasps of astonishment, Chente shouted, "Out here!" All but one of the men turned toward his voice. Chente raised his pistol and shot the one who still had his rifle pointed at the sleeping bags. There was no report or flash, but his target virtually exploded.

The hand torches were doused as everyone scrambled for cover. "Martha!" he shouted, "Get out. Run off to the side!"

He couldn't tell whether she had, but he kept up a steady covering fire, sending stone chips flying in all directions off the cavelet's entrance.

Then someone stuck one of the torches on a pole and hoisted it up.

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The others moved briefly into the open to fire all at once down upon his exposed position. But the Earthman got off one last shot—into the explosives.

The concussion smashed the ground up into his face, and he never heard the cliffside fall across the cavelet, entombing his enemies.

Someone was shaking him, and he felt a nose and a forehead nestled against the back of his neck. "Chente, please don't die again, please," came Martha's voice.

Chente stirred and looked into the wet darkness. His ears were buzzing, and the left side of his head was one vast ache.

"You all right?" he asked Martha.

"Yes," she said. Her hands tightened momentarily against him, but her voice was much calmer. Now that he was conscious she retreated again into a shell of relative formality. "The others must be dead though. The whole overhang came down on them. I followed the edge of the landfall trying to find you. You were not more than a couple of meters beyond it."

"You knew about this plan beforehand?" Chente's soft question was almost a statement.

"Yes—I mean, *no.* There were rumors that our Special Weapons Group killed the first Chente in an unsuccessful attempt to take his communications bomb. I believed those rumors. We used one of our bombs in the Nuclear Exchange of Year 317. The Special Weapons people have devised new uses, new delivery systems for our two remaining bombs, but what they really need are more nukes. In the last few months, I've had reports that the Weapons people are more eager than ever to get another bomb, that they have some special need for it. When you arrived, I was sure that between the Ontarians and our Weapons Group someone would try to kill you."

Chente shook his head, trying to end the buzzing pain. The motion only made him want to be sick. Finally he said, "Their assassination attempt seems incredibly clumsy. Why didn't they just do away with me once we were airborne?"

Now the Providencian ambassadress seemed completely in control of herself. She said quietly, "That was partly my doing. I knew the Weapons people were waiting for another agent to be sent from Earth. When you came through, I made sure you were assigned to an airship crewed by regular Navy men. I was sure it was safe. For years Oswald has been part of the Navy faction opposed to the Special Weapons Group. But somehow they must have got through to him, and at least a few of his crewmen. Their murder attempt was clumsy, but it was a lot more than I had expected, under the circumstances."

Chente sat up and propped his head against his hands. This morass of New Providencian intrigue was

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not completely unexpected, but it was ludicrous. Even if the conspirators could dig his bomb out of the avalanche, it could not be fused without a voice-code spoken by Chente himself. He saw now his mistake in not revealing that fact upon landing. He had thought that all his dire warnings about the colonists' common peril would be enough to get cooperation. The situation was all the more ludicrous since he had seen how real the danger of core collapse was.

"Martha, do you know what I discovered during my survey?"

"No." She sounded faintly puzzled by this sudden change in topic.

"In one hundred fifty years or so there will be another core tremor, about as serious as the one you call the Cataclysm. You people simply don't have time to fight among yourselves. Your only option is to cooperate, to develop a technology advanced enough to ensure your survival."

"I see . . . Then the Special Weapons Group are fools as well as murderers. We should be working together to win the Ontarian war, so we can put all our resources into preparing for the next Cataclysm."

Chente wondered briefly if he were hallucinating. He tried again to explain. "I mean the war itself must be ended; not through victory, but simply through an end of hostilities. You need the Ontarians as much as they need you."

She shook her head stubbornly. "Chente, you don't realize what a ruthless, hedonistic crew the Ontarian rulers are. Until they're eliminated, New Providence will go on bleeding, so that no steps can be taken to protect us from the next Cataclysm."

Chente sighed, realizing that further argument would get him nowhere: he knew his own planet's history too well. He changed the subject. "Are there any settlements on the Fragge?"

"No cities, but there is at least one village about five hundred kilometers southeast of here. It's in the single pocket of arable land that's been discovered on the Fragge."

"That doesn't sound too bad. If we start out before dawn, we may be able to avoid Oswald's—"

"Chente, between here and wherever that village is, there's not a single plant or animal we can eat without poisoning ourselves."

"You'd rather take your chance with Oswald?"

"Certainly. It's obvious that not everyone aboard the *Diligence* was in on this."

"Martha, I think we can make it through to that village." He felt too dizzy to explain how. "Will you come along?"

Even in the darkness, he thought he felt a certain amount of amusement in her answer. "Very well . . . I could hardly return to the *Diligence* alone, anyway. It would give away the fact that you're out here some-

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where." Her hand brushed briefly across his shoulder.

They started inland at the morning's first light, following along the bottom of one of the innumerable tiny ravines cut through the black rock. A temporary but good-sized stream ran down the middle so that they had to walk along the steep, rough ground near the side of the ravine. The buzzing was gone from Chente's head, but some of the dizziness remained. He was beginning to think that his inner ear had been "tumbled" by the explosion, giving him a permanent, though mild, case of motion sickness.

Martha appeared to be in much better condition. Quintero noticed that since she had made up her mind to come along, she seemed to be doing her best to ignore the fact that they were without food, or a reliable means of navigation.

Toward noon they drank rain water from a shallow puddle in the rocks. Twice during the afternoon Chente thought he heard the engines of the *Diligence,* nearly masked by the volcanic thunder to the west. By late afternoon, he estimated they were twenty kilometers inland—excellent progress, considering the ground they were crossing. The ravine became steadily shallower, until finally they left the lava fields and crossed into a much older countryside. The cloud cover swept away and the westering sun shone down from an orange-red sky upon the savannah-like plain ahead of them. That plain was not covered by grass, but by low, multiple-rooted plants that rose like thick green spiders from the ground.

Chente glanced at the sun, and then at the girl who trudged doggedly on beside him. Her initial reserves of energy were gone now and her face was set in lines of fatigue. "Rest break," he said, as they entered the greenery. They dropped down onto plants which, despite their disquieting appearance, felt soft and resilient—something like iceplant back on Earth. The abrupt movement made the world spin giddily around Chente's head. He waited grimly until the wave of dizziness passed, then pulled an oblong case from a pocket and began fiddling. Finally Martha spoke, her tired voice devoid of sarcasm, "Some Earthside magic? You're going to materialize some food?"

"Something like that." A small screen flashed to life on the wide side of the oblong. He sharpened the image, but it was still no more than abstract art to the uninitiated: a mixed jumble of blue and green and brown. He didn't look up as he said, "Martha, did you know that the starship left several satellites in orbit before it landed on New Canada?"

She leaned closer to him, looked down at the screen. "Yes. If you know where to look you can often see them at night."

"They were put up for your colony's use, and though you no longer

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have receiving equipment, they are still in working order."

"And this thing—"

". . . Is reading from a synchronous satellite some 40,000 kilometers up. This picture shows most of the Fragge."

Martha's fatigue was forgotten. "We never dreamed the satellites could still work. I feel like God looking down on things this way. Now we can find that village easily."

"Yes—" Using the controls at the side of the display he began to follow the Fragge's coastline at medium resolution.

Martha spoke up again. "I think we're seeing the north coast now. At least, the part that isn't under cloud looks like the last map I saw. The village is to the southeast of us, so you're not going to find much of anything—"

Chente frowned, looked more closely at the screen, then increased the magnification. It was as if the camera had been dropped straight toward the ground. The tiny bay at the center of the screen swelled to fill the entire display. Now they were looking down through late afternoon haze at a large natural harbor. Chente identified thirty or forty piers and a number of ships. All along the waterfront buildings cast long, incriminating shadows. He pushed a button and five tiny red lights glowed over the image of one of those buildings.

Martha was silent for a long moment. She looked more closely at the picture, and finally she said, "Those ships, they're Ontarian. They have an entire naval base hidden away there. The scum! I can imagine what they're planning: to build up a large secret reserve, and then tempt us into a major battle. Why, Chente, this changes our entire naval situation. It—" Suddenly she seemed to realize that she was not sitting in some intelligence briefing, but was instead stranded thousands of kilometers from the people who could use this discovery.

Chente made no comment, but returned the magnification to its previous level. He followed the coastline all the way around to the south and eventually found two other settlements, both small villages.

"Now let's try to find some food," he said. "If I'm oriented properly, I've got the picture centered on our location." He stepped up the magnification. On the enlarged scale they could see individual hillocks and identify the small stream they had crossed half a kilometer back. Toward the top of the picture, a collection of spikelike shadows stretched several millimeters. He magnified the image still further.

"Animals," Chente said. "They look better than two meters long."

"Then they're buzzards."

"Buzzards?"

"Yes, herbivores. The next largest thing we know about on the Fragge is a predator not much more than a meter long."

Chente grinned at her. "I think

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I've materialized that food for you."

She looked dubious. "Only if I can acquire a taste for copper salts in my meat."

"Perhaps we can do something about that." He looked at the scale key that flickered near the bottom of the picture. "That herd isn't more than five thousand meters away. I hadn't expected luck this good. How long till sunset? Two hours?"

Martha glanced at the sun, which hung some thirty degrees off the stony ridges behind them. "More like ninety minutes."

"We'll have buzzard soup yet. Come on."

The pace he set was a slow one, but in their present state it was about the best they could do. The spidery vegetation caught at their feet and the ground was not nearly as level as it looked. An hour and three quarters passed. Behind them the sun had set, and only the reddish sky-glow lighted their way. Chente touched Martha's elbow, motioned her to bend low. If they spooked the herd now, they would have a hungry night. They crawled over a broad hill crest, then lay down to scan the plain beyond. They had not been too cautious: the herd was some five hundred meters down the slope, near a waterhole. Chente almost laughed; buzzards, indeed! They certainly hadn't been named by the first-generation colonists. In this light the creatures might almost have been mistaken for tall men stooped over low against the ground. Their thin wings were clasped behind their backs as they walked slowly about.

Chente chose a medium-sized animal that was browsing away from the main group. He silently took his pistol from his coverall and aimed. The beast screamed once, then ran fifteen meters, right into the waterhole, where it collapsed. The others didn't need two warnings. The herd stampeded off to Chente's right. The creatures didn't run or fly—they bounded, in long, wing-assisted leaps. The motion reminded Chente of the impalas he had seen in the San Joaquin valley. In fact, their ecological niche was probably similar. *In which case,* he thought, *we'd better watch out for whatever passes for lions around here.*

The humans picked themselves up, and walked slowly down toward the abandoned waterhole. Vicente waded cautiously into the shallow, acrid-smelling water. The top of the buzzard's head was blown off. It was probably dead, but he didn't take any chances with it. By the time he got the hundred-kilo carcass out of the pool the short twilight was nearly ended. Martha took over the butchering—though she remarked that buzzards didn't have much in common with the farm animals she was used to. Apparently she had not spent her whole life administrating. He watched her work in the gathering darkness, glad for her help and gladder for her presence.

When the beast was cut into small

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enough pieces, Chente took a short cylinder from his coveralls and fed some of the meat into it. There was a soft buzzing sound, and then he pressed a cup into Martha's hand. "Buzzard soup. Minus the heavy metal salts."

He could just make out her silhouette as she slowly raised the cup to her lips and drank. She gagged several times but got it all down. When Chente had his first taste he understood her reaction. The sludge didn't *taste* edible.

"This will keep us alive?" Martha asked hoarsely.

"For a number of weeks, anyway. Over a longer time we'd need dietary supplements." He continued feeding the buzzard to the processor, and bagging the resulting slop.

"Why hasn't Earth given us the secret of this device, Vicente? Only one percent of New Providence has soil free from metallic poisons, and Ontario is only three or four times better off. With your processor we could conquer this planet."

He shook his head. "I doubt it. The machine is a good deal more complicated than it looks. On Earth, the technology to build one has existed for less than thirty years. It's not enough to remove the heavy metals from the meat. The result would still be poisonous—or at least nonnutritious. This thing actually reassembles the protein molecules it rips apart. For the technique to be of any use to you, we'd have to ship a factory whole. You just—"

Chente heard a faint hiss above and behind him. Martha screamed. As he whirled and drew his pistol he was bowled over by something that had glided in on them in virtual silence. Chente and the birdlike carnivore spun over in the spider-weed, the thing's beak searching for his face and throat but finding Chente's upthrust forearm instead. The claws and beak were like knives thrust into his chest and arm. He fired his pistol and the explosion sent the attacker into pieces all over him.

Chente rolled to a sitting position and played fire around the unseen landscape in case there were others waiting. But all he heard was vegetation and earth exploding as the water within them was brought violently to a boil.

The whole thing hadn't lasted more than ten seconds. Now the night was silent again. Chente had the impression that his attacker had been built more like a leopard than a bird. New Canada's dense atmosphere and low gravity made some peculiar things possible.

"Are you all right, Chente?"

The question made him aware of the slick flow of blood down his forearm, of the gashes across his ribs. He swore softly. "No bones broken, but I got slashed up. Are these creatures venomous?"

"No." He heard her move close.

"Good. The first-aid equipment I've got should be enough to keep me going, then. Let's get our stuff away from this waterhole or we'll be

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entertaining visitors all night long." He got stiffly to his feet.

They collected the bags of processed meat and then walked three hundred meters or so from the waterhole, where they settled down in the soft spider-weed. Chente took a pain killer, and for a while everything seemed hazy and pleasant. The night was mild, even warm. The humidity had dropped steadily during the afternoon, so that the ground felt dry. A heavy breeze pushed around them, but there were no identifiable animal sounds: New Canada had yet to invent insects, or their equivalent. The sky seemed clear, but the stars were not so numerous as in an earthly sky. Chente guessed that the upper-atmosphere haze cut out everything dimmer than magnitude three or four. He looked for Sol near the head of the Great Bear but he wasn't even sure he had spotted that constellation. More than anything else, this sky made him feel far from home.

He lay back, going over in his mind what he had discovered since his arrival. When his predecessor had failed to report, they had tried to prepare him more thoroughly for his return to New Canada. But none of the historians, none of the psychologists had guessed what an extreme social system had developed here. It must have begun as an attempt by the shattered colony to reform society after the Cataclysm, forging a fragile unity from zealous allegiance. But now it bled the warring nations dry, while blinding the people to the possibility of peace, and what was worse, to the absolute necessity for working together. By rights he should now be a hero among the New Canadians. By rights they should be taking the technical advice he could give to increase what small chances there might be to survive the next core tremor. Instead, he was marooned on this forlorn continent, and the only person who had any real desire to help him was just as much an hysterical nationalist as everyone else.

But his mission still remained, even if he couldn't get the locals to cooperate in saving themselves. In spite of its terrible problems, New Canada was a more viable colony than most. After four centuries of space flight, Earth knew how rare are habitable planets. Man's colonies were few. If those failed, there would be no hope for mankind ever to expand itself beyond the Solar System, and eventually the entire race would die of its own stagnation.

Somehow, he had to end this internecine fighting, or at least eliminate the possibility of nuclear war. Somehow he had to force the colonists to fight for survival. At the moment he could see only one possibility. It was a long shot and deception was its essence. How much deception, and of whom, he tried not to consider.

"Martha?"

"Yes?" She huddled tentatively against him, all reserve finally gone.

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"We're going to make for that Ontarian base rather than the villages south of here."

She stiffened. "What? No! In spite of what some of my people tried to do to you, the Ontarians are still worse. Why—"

"Two reasons. First, that naval base is only two hundred fifty kilometers away, not five hundred. Second, I mean to stop this warfare between your two states. There must be peace."

"A just peace? One where we won't have our mines expropriated by the Ontarians? One where we get our fair share of the farmland? One where feudalism is outlawed?"

Chente sighed. "Yes." *Something like that.*

"Then I'll do anything to help you. But how can going to the Ontarians bring peace?"

"You remember those red blips on my display? Those were signals from the transponders that are on each of the communications bombs. If I've been keeping count properly, this means that the Ontarians have all their nuclear weapons stored at this base. If I tell them of New Providence's treachery, and offer my services, I may eventually get a crack at those bombs."

"It might work. Certainly, the world isn't safe as long as those fanatics have the bomb, so perhaps it's worth the risk."

Quintero didn't answer. He gave one quick glance around, saw no "leopards" in the pale starlight. Then he drew Martha into his arms and kissed her, and wondered how many times he had kissed her before.

Two hundred and fifty kilometers in five days would have been no burden for Chente if he had started fresh and uninjured. As it was, however, his dizziness and wounds slowed him down to the point where Martha could move as fast as he. Fortunately it didn't rain again and the nights remained warm. Waterholes were easily detected from orbit, and when they ran out of food after three days they had no trouble getting more meat—this time without having to fight for it.

But by the morning of the fifth day, they were both near the limit of their resources. Through the haze of pain-killer drugs and motion-sickness pills, the landscape gradually became unreal to Chente. He knew that soon he would stop walking, and no effort of will would get him moving again.

Beside him, Martha occasionally staggered. She walked flat-footedly now, no longer trying to favor her blisters. He could imagine the state of her feet after five days of steady walking.

Ahead stretched a long hill, its crest some five thousand meters away. Chente stopped and studied his display. "Just over that hill and we're home—"

Martha nodded, tried to smile. The news seemed to give them new strength and they reached the crest

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in less than ninety minutes. Below them lay the harbor they had discovered five days earlier on Chente's display. It was separated from the sea by overlapping headlands some ten kilometers further north. South of the green and brown buildings were the unpoisoned farmlands which apparently supported the base.

They looked down on the base only briefly, then silently started toward it. The possibility that they might be shot out of hand had occurred to them, but now they were too tired to worry much about it.

They were picked up by a patrol before they reached the tilled fields. The soldiers didn't shoot, but it was obvious that the visitors were unwelcome. Chente was relieved of his hardware and he and Martha were hustled into an olive-drab car that performed much more efficiently than the huffer Mayor Flaggon drove. Apparently the Ontarians could make fairly good machinery, when ostentation didn't require otherwise. Their captors made no attempt to prevent them from looking about as they drove through the base toward the water's edge, and Chente forced his tired mind to take in all he could. They tooled over the brick-paved road past row after row of warehouses—a testament to Ontarian perseverance. To bring so much equipment and material must have taken many carefully planned voyages. And to avoid Providencian detection, the supply convoys would have had to be small and inconspicuous.

They turned parallel to the long stone quay and drove between huge earthen reservoirs—presumably filled with vegetable oils—and piles of kindling. Further along the quay they passed several cruisers and a battleship. New Canadian ships were noticeably smaller than their counterparts in the old-time navies of Earth. A battleship here might run eight thousand tons and mount six 25-centimeter guns. A fleet of airships sat on the mudflats across the bay. No wonder Balquirth had had no fliers to spare on Wundlich.

Finally they stopped before a long three-story building that looked a good deal more permanent than the wooden warehouses. The driver unlocked the door to the passenger compartment and said, "Out." Two soldiers covered them with what looked like four-barreled shotguns as they followed the driver up the steps to the building's wide doorway.

The inside of the building was quite a contrast to the camouflaged exterior: deep-blue carpets covered the floor while paintings and tapestries were hung from the polished silver walls. Filament lamps glittered along the windowless hallway. They were led stumbling up two flights to a massive wooden door. One of the guards tapped lightly, and a muffled, though familiar, voice from beyond the door said, "Enter."

They did so and found Pier

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Balquirth surrounded by aides and a pair of curvaceous secretaries. "Freeman Quintero! I should have guessed it was you. And the lovely, though girdle-bound, Miss Blount. Indeed, no longer girdle-bound—?" He raised his eyebrows. "Sit down, please. I have the feeling you may fall down if you don't. I apologize that I don't give you a chance to rest before talking, but a decent regard for Machiavelli demands that I ask some questions while your defenses are down. Whatever happened to Captain Oswald and his gallant crew?"

Chente brought the Ontarian up to date. As he spoke, Balquirth removed a cigar from his desk and lit up. He drew in several puffs and exhaled green smoke. Finally he waved his hand in amusement. "That's pretty sloppy work for the Special Weapons Group, but I suppose they were trying to make your death seem an accident. I hope this opens your eyes, Freeman. Though the Special Weapons Group is the most ruthless bureaucracy within the tight little totalitarian state that calls itself New Providence, the other Groups aren't much better. New Providence may be slightly ahead of the Ontarian Confederation technologically, but they use their advantage simply to make life unbearable for their 'Citizens', and to spread misery to other folk as well."

Martha glared dully at Balquirth but kept silent. Chente recalled Balquirth's casual, almost reckless attitude back in Freetown. He came close to smiling. A dandy and a fool are not necessarily the same thing. "You know, I think you drove me into the arms of New Providence just to create this situation."

Balquirth looked faintly embarrassed. "That's close to the truth. I stuck my neck way out to get your predecessor on one of my vessels. The first Quintero completed his survey, and told me his discoveries—I'm sure you've made these same discoveries by now—but he wouldn't believe that a loose confederation like Ontario could handle the preparations for this core tremor. He kept insisting that both New Providence and Ontario must somehow unite and work together. These are nice sentiments, but he just didn't realize how intolerant and uncompromising Miss Blount's friends can be. When the New Providencians killed him, my government—and myself in particular—were the goats.

"This time I thought I'd let you go with the Providencians. They'd try to kill you and steal your gadgets, but I knew that without your active cooperation they wouldn't get much use out of them. And I knew you were too stubborn to let them cajole you over to their side. If you were killed, then they would look bad. If by some quirk they didn't manage to kill you, I was pretty sure that you would realize what an unpleasant bunch they are.

"I am truly pleased that you survived, however. Can we depend on

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your help, or are you even more stubborn than I had guessed?"

Chente didn't answer immediately. "Are you in charge here?"

Pier chuckled. "As those things go in the Ontarian Confederacy—yes. We've got men and material from four major bossdoms here, and their chiefs are at each other's throats half the time. But the base was my idea, and the Bossmanic Council in Toronto has appointed me temporarily superior to the three other bossmen involved."

The answer gave Chente a moment to think. In his way, the Ontarian was just as likable and just as much the capable fanatic as Martha. The only difference was that by accident of birth, one was supporting a loose feudal confederation and the other a more industrialized, more centralized regime. And both were so in love with their systems that they put national survival before the survival of the entire colony. Finally he said, "Your plan has convinced me—hell, it practically killed me. If you'll bring in the things they confiscated, I may be able to show you something you can use." Beside him, Martha's expression became steadily darker, though she still maintained her silence.

The bossman turned to one of his secretaries: "Darlene, go out and have Gruzinsky bring in any equipment he's holding. The rest of you leave, too—except Maclen, Trudeau, and our guests," he gestured at Chente and Martha. Chente glanced at his companion, wondered why Balquirth had permitted her to remain. Then he realized that the Ontarian had guessed his involvement with Martha, and was gauging his truthfulness by the exhausted woman's reactions.

A soldier brought in the various items taken from Chente and Martha, and placed them on the low table that sat before Balquirth's empillowed throne. The bossman picked up Chente's weapon. It looked vaguely like a large-caliber pistol, except that the bore was filled with a glassy substance.

"This does what I think it does?" Bossman Pier asked.

"Yes. It's an energy weapon—but the radiation is in the submillimeter range, so there isn't much ionization along the beam path, and your target can't see where your fire is coming from. But you'll find this more interesting." He pulled the satellite display toward himself and pushed the green button on its side. The tiny screen lit up to show a section of coast and ocean. Balquirth was silent for several seconds. "Very pretty," he said finally, but the banter was gone from his voice. "I never guessed the satellites were still working."

"The colonial planners built them to last. They didn't expect you would be able to go up and repair them."

"Hm-m-m. Too bad they didn't build our ground receivers the same way. What's that?" Balquirth inter-

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rupted himself to point at a tiny white "vee" set in the open ocean between two wide cumulous cloud banks.

"A ship of some kind. Let's have a closer look." Chente stepped up the magnification. The craft was clearly visible, its white wake streaming out far behind it.

"Why, that's the *Ram*!" one of the Ontarian officers exclaimed. "This is incredible! That ship left thirty-three hours ago. She must be hundreds of kilometers out, and yet we can see her as if we were flying over in an airship. When was this picture taken?"

"Less than a second ago. The coverage is live."

"What area can be observed with this gadget?"

"Everything except the poles, though high resolution pictures are available only up to latitude 45 degrees."

"Hm-m-m, we could reconnoiter the entire Inner Ocean." Pier touched one of the knobs. Now that Chente had activated the device it responded to the Ontarian's direction. The *Ram*'s image dwindled, slid to one side, and they looked down on an expanse of cloud-stippled ocean. Chente started. Almost off the left side of the screen was a cluster of wake "vees". Balquirth increased the magnification until the formation filled the screen.

"Those aren't ours," one of the officers said finally.

"Clearly," said Balquirth. "It's equally clear that this is a New Providencian fleet, Colonel Maclen. And their wakes point our way."

"Looks like four Jacob class battleships, half a dozen cruisers, and twenty destroyers," said the second, older officer. "But what are those ships in the trailing squadron?" His eyes narrowed. "They're troop transports!"

"Now, I wonder what an invasion force would be doing in this innocent part of the world," said Pier.

The older officer didn't smile at the flippancy. "From their wake angles I estimate they're making thirty kilometers an hour, Bossman. If I read the key on the screen right, that means we have less than forty-four hours."

Chente glanced across at Martha, saw her eyes staring back at him. Now he knew why the Special Weapons people had wanted another bomb. Pier noticed their exchange of looks.

"Any idea why this invasion should coincide with your arrival, Freeman Quintero?"

"Yes. My guess is that certain Providencian groups discovered your base here some months ago, but deferred attack until they could get still another nuclear bomb—namely the one I brought—for their stockpile."

The bossman nodded, then seemed to put the matter aside. "Admiral Trudeau, I intend to meet them at sea. We have neither the shore batteries nor the garrison to

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take them on at the harbor entrance."

The officer nodded, looking unhappy. "But even with this much warning," he nodded at the screen, "they've still caught us with our pants down. I only have three cruisers, two battleships, and a handful of escort craft in port. We can't stop four Jacob class battlewagons and a half dozen cruisers with that, Bossman."

"We have the bombs, sir," Colonel Maclen broke in.

"You Army sorts are all alike, Colonel," Admiral Trudeau snapped. "The only time you ever used a bomb, it was smuggled into New Providencian territory and exploded on the ground. On the open sea we need at least twenty kilometers clearance between our fleet and the target. It's mighty hard to sneak a dirigible, or a torpedo boat, across a gap that wide."

Maclen had no answer to the criticism. Chente suddenly saw an opportunity to get at the Ontarian bombs and perhaps to destroy the Providencian nuclear capability in the bargain. He said, "But those comm bombs were mounted on drive units powerful enough to boost them out of the atmosphere. Why don't you alter the drive program and let them deliver themselves?" The three Ontarians looked at him open-mouthed. Beside him he heard Martha gasp.

Balquirth said, "You can make such alterations?"

Chente nodded. "As long as we know the target's position, I'll have no problem."

Martha gave an inarticulate cry of rage as she lunged across the table, picked up the recon display and flung it to the floor. Maclen and Trudeau grabbed her, forced her away from the table. Balquirth retrieved the display. The picture on the screen still glowed crisp and true. He shook his head sadly at Martha. "That's it, then. Trudeau, sound general alarm. I want some kind of fleet ready to sail in twenty-two hours."

The Navy man left without a word. Balquirth turned back to the Earthman. "You're wondering why I don't keep the fleet here, and lob the bomb out to sea when the enemy comes in range?"

Chente considered wearily. "That would be the prudent thing to do—if you trusted me."

"Right. Unfortunately, I don't trust you that far. I'll let you decide which bomb you want, and let you supervise the launch, but I'd rather not risk this base on the possibility of a change in your heart. We may not have many ships here yet, but the physical plant we've developed makes this one of the best naval bases in our confederation—whether it remains secret or not."

Chente nodded. Martha murmured something; Balquirth turned to her and bowed almost graciously. "You may come along, too, if you wish, Miss Blount."

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The *Fearsome,* Admiral Trudeau's flagship, displaced seventy-three hundred tons and could run at better than forty kilometers per hour. She was doing at least that now. Chente stood on the bridge and looked out over the foredeck. After being treated by Ontarian medics, he had slept most of the preceding day. He felt almost normal now, except for a stiffness in his arm and side and occasional attacks of vertigo.

He had studied naval types of the Twentieth Century quite thoroughly back home, and in many ways the *Fearsome* was a familiar craft. But there were differences. The Ontarian construction had a faintly crude, misshapen appearance. Standardized production techniques were only beginning to appear in the Confederacy. And without petroleum resources or coal, the nations of New Canada were forced to use vegetable oils or wood to fire their boilers—the greasy black smoke that spouted from the *Fearsome*'s stacks was enough to cause a queasy stomach even if his inner ear and the rolling sea were not. The ship had a huge crew. Apparently its auxiliary devices were not connected to the central power plant. Even the big deck guns needed work squads to turn and angle them. In a sense the *Fearsome* was a cross between a Roman galley and a 1910 battleship.

So far Chente's jury-rigged plans had gone much more smoothly than he had dared to hope. At Balquirth's direction, Colonel Maclen had shown him the maximum security storage bunker where Ontario's five nuclear weapons were located. Only one was needed for this mission, but the Earthman had been allowed to check the missiles' drive units in making his selection. Apparently, neither Maclen or Balquirth realized that a simple adjustment of the drive unit could render the bomb itself permanently unusable. It had taken Chente only a moment to so adjust four of the five weapons.

Now the hastily formed Ontarian fleet was under full steam, with the bomb launch less than an hour away. In addition to the *Fearsome,* the fleet contained the battleship *Covenant* and two large cruisers—essentially as protection for that one bomb. When they were within missile range of the Providencians the Ontarian fleet would turn away, and Balquirth and Chente would take the bomb aboard the motorized boat which now sat near the *Fearsome*'s stern. Not until then would Chente be allowed to touch the bomb's trigger.

Chente looked down at Martha, who sat beside him on the bridge gazing fixedly out at the ocean. Her wrists had been manacled, but when the sea got choppy Admiral Trudeau had removed the cuffs so that she could more easily keep her balance. She had not spoken a single word for the last three hours, had seemed almost like a disinterested spectator. Chente touched her shoulder, but she continued to ignore him.

The starboard hatch opened and

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Balquirth, dressed now in utility coveralls and a slicker, stepped onto the bridge. He spoke briefly with Trudeau, then approached the Earthman. "We've got problems, Freeman. This storm has kicked up a bit faster than the weather people predicted. We can't spot our fleet on the display, and the New Providencian force will be under cloud cover in another fifteen minutes."

Chente shrugged, and the gesture brought a sharp pain to his side. "No matter. That satellite we're reading from was also intended for navigation. It's got radar powerful enough to scan the ocean. We'll be able to keep track of the other fleet almost as easily as if there were no storm at all."

"Ah, good. Let's go below and take a look at the display, then. You said we could launch the missile from twenty-five kilometers out?"

"That's the effective range. Actually the bomb's drive unit could push it much farther, but it wasn't designed as a weapon, so it would be terrifically inaccurate at greater ranges."

Chente and Balquirth left the bridge and went carefully down the steep ladderway to the charthouse. The sky was completely overcast now, and a gathering squall obscured the horizon. He could barely make out the forms of the escort craft, far off to the side. The hard cold wind that sleeted across the *Fearsome* presaged the storm's arrival.

The charthouse was hidden from the direct blast of the wind by several armored buttresses and a gun turret. Five armed seamen stood at the entrance; once they recognized Balquirth, there was no trouble getting inside. The charthouse itself was well insulated from the outside, as the instruments it housed required better care than men did. Balquirth had had all of Chente's equipment stowed here, along with the communications bomb, a two-meter-long cylinder of black plastic that rested in a case of native velvet near the cabin's interior bulkhead.

Maclen sat beside some bulky and primitive wireless equipment. The young colonel held a repeating slug gun at the ready position. He was the room's only occupant. Apparently Pier trusted only his top aides with this Pandora's box of Earthly artifacts.

"All secure, sir," Maclen said. "I let the navigator take some charts but no one else has been by."

"Very good, Colonel," said Balquirth. "All right, Freeman, it's all yours."

Chente approached the brass chart table and the satellite receiver. He fiddled briefly with the controls, and the screen turned gray. A tiny point of light moved slowly from left to right across the top of the screen, then returned to the left margin and started across again. "That's the scanning trace from the satellite. It's illuminating a square kilometer as it moves across the ocean. The satel-

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lite's maser isn't powerful enough to light up a larger area, so the picture must be built up from a sequence of scans." The tiny blip of light shifted down about a millimeter with each scan, but still nothing showed in its track. Finally, two golden blips appeared, and in the scan below that, another blip.

"The Providencians," Balquirth said, almost to himself.

Chente nodded. "At this resolution, it's difficult to see individual ships, but you get the idea of their formation."

"What's that red blip?" Bossman Pier pointed to the newest apparition.

"That must be a transponder on one of the Providencian bombs. All the communications bombs transmit a uhf signal in response to microwave from the satellite. I suppose that originally the gimmick was used to find dud bombs that fell back to the surface without detonating."

"So they really thought they were going to wipe us out," said Pier. "This is even better than I had hoped."

The scanning dot moved relentlessly across the screen, shifting down with each pass to reveal more and more of the Providencian fleet. Finally they could see the echelon structure of the enemy forces. For ten more scans, no new blips appeared. Then a single red blip showed up far south of the enemy fleet. Chente caught his breath.

Balquirth looked across the table at him. "How far is that bomb from us?" he said quietly.

Chente held up his hand, and watched the scanning dot continue across the screen. He remembered Martha's remarks about the Providencians having special delivery systems. Then the scanning dot showed the leading elements of the Ontarian fleet—just six lines below the red dot. "Less than ten kilometers, Bossman."

Balquirth didn't reply. He looked at the display's key, then rattled off some instructions into a speaking tube. General quarters sounded. Seconds later Chente heard the *Fearsome*'s big deck guns fire.

Finally Balquirth spoke to Chente. His voice was calm, almost as if their peril were someone else's. "How do you suppose they detected our fleet?"

"There are a number of ways. Martha said the Providencians were experimenting with a lot of gadgets of their own design. In fact they may not have detected us. That bomb is probably aboard a small, unmanned boat. They may just keep it thirty or forty kilometers ahead of their fleet. Then if it hears the sounds of propellers nearby it detonates."

"Ah, yes. Research and development—isn't it wonderful."

They stood waiting in silence. Ten kilometers away, a barrage of heavy artillery was arcing down on the cause of that innocuous red blip. Any second now they would discover

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just how cleverly the New Providencians had designed their delivery system.

From outside the windowless charthouse came screams. No other sounds, just screams. Chente smelled fire, noticed the insulation around the closed hatch was beginning to smoke. He and Balquirth hit the deck, and Maclen was not far behind. The bomb's searing flash had crossed the ten kilometers separating them at the speed of light, but they would have to wait almost seven seconds for the water-borne shock wave to arrive.

Chente heard a monstrously loud ripping sound, felt the deck smash into his chest and head. He was not conscious when the air-borne shock wave did its job, peeling back the charthouse bulkhead and part of the deck above them.

Chente woke with rain in his face, and the muffled sound of exploding ammunition and burning fuel all around. Behind all these sounds, and nearly as insistent, was a steady roar—the last direct evidence of the nuclear explosion.

The Earthman rolled over, cursing as he felt the stitches the Ontarian doctors had put in his side come apart. His head rang, his nose was bleeding, and his ears felt stuffed with cotton. But as he shook the rain out of his eyes he saw that the others in the charthouse had not fared so well. On the other side of the cabin, Maclen's body was sprawled, headless. Nearer, Balquirth lay unmoving, a pool of blood spreading from his mouth.

For a few moments Chente sat looking stupidly at the scene, wondering why he was alive. Then he began to think. His plans to destroy the Providencian bombs were ruined now that the Ontarian fleet had been destroyed. Or were they? Suddenly he realized that this turn of events might give him hope of completing his mission and still escaping both groups. Chente struggled to his feet, and noticed the deck was listing—or was it only his sense of balance gone awry again? He recovered the recon display and his pistol, then picked the communications bomb from its case. The bomb didn't mass more than fifteen kilograms, but it was an awkward burden.

Outside the charthouse the mutilated guards' bodies lay amid twisted metal. The ship's paint was scorched and curling even in the rain. The after part of the ship was swallowed by flame, and the few people he saw alive were too busy to notice him.

Martha. The thought brought him up short, and he reconsidered the possibilities. Then he turned and started toward the bridge. He could see the gaping holes where the glass had been blown out of the bridge's ports. Anybody standing by those ports would be dead now.

Then he saw her, crawling along the gangway above. The deck listed a full ten degrees as he pulled himself up a ladderway to reach her. "Let's get off this thing!" he shouted

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over the explosions and the fire. He caught her arm and helped her to her feet.

"What—?" She shook her head. A trickle of blood ran from one ear down her neck. Her face was smeared with grime and blood.

He could barely hear her voice, and realized the explosion must have deafened them all. He held onto her and shouted again into her good ear. For a moment she relaxed against him, then pulled back, and he saw her lips mouth: "Not with . . . traitor!"

"But I was never going to use that bomb on your people. It was just a trick to get at the Ontarian bombs." It was the biggest lie he'd told her yet, but he knew she wanted to believe it.

He pointed toward the *Fearsome*'s stern, and shouted, "To the launch!" She nodded and they staggered across the tilting, twisted deck, toward the flames and the sound of explosions. Everyone they met was going in the opposite direction, and seemed in no mood to stop and talk.

Now there was only one narrow path free of flames, and the heat from either side was so intense it blistered their skin even as they ran through it. Then they were beyond the flames, on the relatively undamaged stern. Chente saw that the motor launch had been torn loose from its after mooring cable, and now its stern hung down, splashing crazily in the water. Several bodies lay unmoving on the scorched deck, but no one else was visible. They crawled down to where the bow of the launch stuck up over the railing. Chente had almost concluded they were alone on the stern, when Balquirth stepped from behind the wreckage next to the launch's moorings.

The Ontarian swayed drunkenly, one hand grasping the jagged and twisted metal for support. His other hand held a slug gun. The lower part of his face was covered with blood. Chente staggered toward him, and shouted, "Thought you were dead. We're going ahead with your plan."

Through the blood, Pier almost seemed to smile. He gestured at Martha. "No . . . Quintero," his voice came faintly over the sounds of rain and fire, ". . . think you've turned your coat . . ."

He raised the pistol, but Chente was close to him now. The Earthman lunged, knocking the gun aside with his bomb, and drove his fist hard into Pier's stomach. The other crumpled. Chente staggered back, clinging to the rail for support. It struck him that the fight must have looked like a contest between drunks.

He turned to Martha, and waved at the launch, "We'll have to jump for it, before that other cable breaks."

She nodded, her face pale with cold and fear. They were cut off from the rest of the ship by the spreading fire, and even as he spoke the *Fearsome* tilted another five or

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ten degrees. He climbed over the rail and jumped. The drop was only three meters, but his target was moving and he was holding the bomb. He hit hard on his bad side and rolled down the launch's steeply sloping deck.

Gasping for breath he dragged himself back up the deck and waved to Martha above him. She stood motionless, her fists tightly clenched about the railing. For a moment, Chente thought she would balk, but she slipped over the railing and jumped, her arms outstretched. He managed to break her fall and they both went sprawling. They crawled clumsily down the bobbing deck toward the craft's cockpit. Martha struggled through the tiny hatch, and Chente pushed the bomb after her. Then he turned and fired at the remaining mooring cable.

The launch knifed into the water and for a moment submerged completely, but somehow Chente managed to keep being washed away. The boat bobbed back to the surface, and he scrambled into the cockpit.

From his talks with Balquirth, Quintero knew the boat had a steam-electric power plant—it was ordinarily used for espionage work. Looking over the control panel, Chente decided that this was the most advanced Ontarian mechanism he had encountered—just the kind of luck they needed. He depressed the largest switch of the board and felt a faint humming beneath his feet. He eased the throttle forward. As the launch pulled slowly away from the foundering *Fearsome*, he thought he heard the whine and snick of small fire caroming off the boat's hull; apparently Balquirth was not easily put out of action. But now it was too late to stop their escape. The *Fearsome* was soon lost to sight amid the deep swells and pounding rain. The last Chente saw and heard of the Ontarian fleet was a pale orange glow through the storm followed by a sound that might have been thunder. Then they were alone with the storm.

The storm was bad enough in itself. The tiny cabin spun like a compass needle, and several times Chente was afraid the boat would capsize. Somehow Martha managed to tie down the equipment and dig a couple of life jackets out of a storage cubby.

Chente fastened the recon screen to the control board, and inspected the radar display. On high resolution he could distinguish every vessel in the area. Even his motor launch showed—or at least the transponder on his communications bomb did. They would have no trouble navigating through this storm, if they didn't sink. He briefly thanked heaven that the comm bombs were about as clean as anything that energetic can be: nearly all the energy was radiated as soft X rays. At least they didn't have to worry that the rain was drenching them in radioactive poisons.

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"Now what?" Martha shouted finally. She had wedged herself in the corner, trying to keep her balance.

Chente hesitated. He had three choices. He could flee the scene immediately; he could use his bomb to destroy the Providencians and their remaining bomb—just as he and Balquirth had planned; or he could indulge in more treachery. The first option would leave the Providencians with a bomb, and an enormous advantage in the world. The second option would be difficult to execute; at this point Martha might be stronger than he was. He might have to kill her. Besides, if he exploded his bomb, he would have no way to make his report to Earth.

That left treachery. "We're going to try to get picked up by one of the ships in the Providencian fleet."

Twenty minutes passed. At the top of the screen the launch's blip moved closer and closer to the red dot that represented the last Providencian bomb. He kept the screen angled so that Martha didn't have a clear view of it.

They should be able to see the ship before much longer. He leaned his head close to Martha and said, "Do you know any signals that would keep them from shooting us out of hand?" He pointed at the electric arc lamp mounted in the windscreen.

Her voice came back faintly over the wind. "I know some diplomatic codes. We update them every fifteen days—they just might respect them."

"We'll have to chance it." Chente helped her light the arc lamp. But there was nothing to see except storm. Chente guided the launch so that its image on the screen approached the other. As they swung over the top of a swell, they saw a long gray shadow not more than two hundred meters ahead. It appeared to be an auxiliary craft, probably a converted cargo ship.

Chente reached across the panel and tapped new instructions into the display. Now the machine was reading the transponder's position from its internal direction finders. Beside him at the control panel, Martha awkwardly closed and opened the signaler's shutter. For nearly thirty seconds there was no reply. Chente held his breath. He expected that this particular ship would be manned by Special Weapons people, who might well be trigger-happy and extremely suspicious. On the other hand, depending on what they expected of the Ontarians, the weapons people might be cocksure and careless.

Finally a light high on one of the ship's masts blinked irregularly. "They acknowledge. They want us to move in closer."

Chente worked the electric boat closer and closer to the ship. Martha continued sending. They were about fifty meters out now, and they could make out the details of the other vessel. Quintero looked closely at his display, then scanned the ship's foredeck. He noticed a shrouded boat

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lashed down near the bow. Its position agreed with the location of the blip on his display. This was better than he had hoped. That was the twin of the robot boat that had nearly destroyed the Ontarian fleet.

He took one hand from the wheel, drew his pistol and fired a single low-power bolt. The thick windscreen shattered, throwing slivers of glass all around. He stepped the pistol's power to full and aimed at the other vessel's bow.

"No!" Martha screamed as she rammed him against the bulkhead. She was tall and strong and she fought desperately. They careened wildly about the cabin for several seconds before Chente got a solid, close-fisted blow to her solar plexus. She collapsed without a sound, and the Earthman whirled back to face the deadlier enemy.

The ship's main guns were turned toward him, but he was below them now. He sprayed fire all along the vessel, concentrating on the smaller deck guns and the shrouded boat. Clouds of steam quickly obscured the glowing craters his pistol gouged in the ship's hull, and then the fuel supply aboard the robot boat exploded in a ball of orange-red flame hot enough to melt the controls of the bomb within.

There was the sparkle of automatic fire from up in the ship's masts, and the cockpit seemed to shred around him. He fired upward blindly and the sparkling ceased.

Chente grabbed the wheel and

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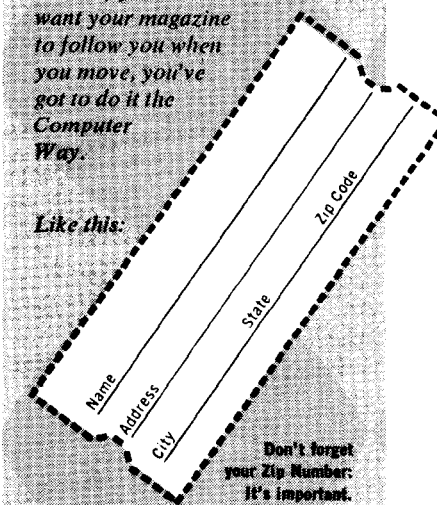

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turned about. The seconds passed but there was no more Providencian gunfire. The sounds of the burning ship quickly faded behind them and they were alone.

They drove steadily west for three hours. The seas fell. Just as the sun set, the clouds cover in the far west moved aside so that the sun shone red and gold through the narrow band between horizon and cloud.

His reconnaissance screen showed no sign of pursuit. More importantly, there was only one transponder blip glowing on Chente's display—his own.

The tiny launch was slowing, and finally Chente decided to try to fire its boiler. He eased the throttle back to null, and the boat sat bobbing almost gently in the sea the sun turned gold.

"Martha?" No response. "I had to do it."

"Had to?" Her tone showed despair and unbelieving indignation. She looked briefly up at him through her rain-plastered hair. "How many Providencians did you kill today?"

Chente didn't answer. The rationalizations that men use for killing other men stuck in his throat, at least for the moment. Finally he said, "I told you, I told the Ontarians: Unless you work together you will all be wiped out. But it didn't do any good just to say it. Now, Ontario and New Providence have a mutual enemy: me. I have the only nuclear weapon left, and I have means to deliver it. Soon I will control territory, too. Your nations will spend their energies to develop the technology to defeat me, and in the end you may be good enough to meet your real peril."

But Martha had resumed her study of the deck, and made no reply.

Chente sighed, and began to pull back the deck plates that should cover the boiler.

The sun set and the first stars of twilight shone through the gap between the clouds and the horizon. Nineteen light-years away, his likeness must still be awaiting his report. In a few weeks, Chente would make that report, using the Ontarian communications bomb. But the people of the New Canada would never know it, for that bomb was the lever he would use to take over some small Ontarian fiefdom. Already he must begin casting the net of schemes and machinations that would stretch one hundred years into this miserable planet's future. It was small consolation to hope that his likeness would live to see other worlds. ■

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P. Schuyler Miller

WHERE WE ARE

This is not the place, nor am I the person to attempt an evaluation of what John Campbell did to make science fiction what it is, or to explain how he did it. For that, I commend you to the appreciations that are beginning to appear in the fan publications, in which people who knew him and worked with him make clear how much he really did to shape the entire field, including the themes of which the "New Wave" is so proud. I have seen only two so far, but there will be others. If you can get a copy—and I am not sure single copies will be available—read what Lester del Rey, and Hal Clement, and James H. Schmitz, and Kelly Freas, and many others have to say in Issue 90 of *Locus*, the weekly SF news magazine published by Charles N. Brown of 2078 Anthony Avenue, Bronx, New York 10457, or the tribute by Isaac Asimov in the August *Luna*, published by Frank Dietz of 655 Orchard Street, Oradell, New Jersey 07649. *Luna* is fifty cents, and *Locus 90* should be about the same.

What these statements will do is show you how a great editor works—something the reader never knows, and finds hard to understand unless he has been a writer or an illustrator. And then read what John said, himself, in the introduction to Alva Rogers's "Requiem for Astounding," the book published by Advent in 1964. You will find it on the last page of a paperback by a Swedish fan, editor, publisher, and television pro-

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ducer, which Ace brought out in the author's own excellent English version just as we learned of John's death, and that just a week before of August Derleth, who had almost single-handedly kept weird fantasy alive over the years.

"Science Fiction: What It's All About," by Sam J. Lundwall (Ace Books, New York; No. 75440; 256 pp.; 95¢) could not have been better timed. As we stand at the end of an era, wondering where we really are and where we are going, it will help us see what has happened to build the genre we call science fiction. in the lifetime of many of us. Nor is this an old fan's nostalgia; Sam Lundwall writes as a European, familiar with the literature of Western society in a way most Americans never are. You will find him hard-nosed and conservative about the place of fantasy and speculative fiction in the "SF" family, and in some cases almost as inflexible as Sam Moskowitz in seeing willful borrowing–plagiarism–where I doubt that it occurs. His English is more colloquial than most academic translators', and he is crammed with ideas that will make you evaluate what you look for in science fiction rather differently than you may have done in the past.

Let me quote a little from his opening chapter, and mention a few of those ideas:

"When I started to read science fiction seriously, about twenty years ago, it seemed to be offering a subversive thing, the prospect of change. Changes recur constantly in science fiction: changes in our environment, our future, our attitudes. . . . The idea of change is deeply subversive to the Establishment, it must always be, and I think this is why H. G. Wells . . . has never been really accepted into English literature.

"This is, in my opinion, what makes the science-fiction point of view different and makes it stand apart from mainstream literature . . . Science fiction's strength has always been in its ideas, not in its forms, and the merits of the genre lie not in its paraphernalia . . . but in the message that nothing, absolutely nothing can be taken for granted, and that we always must be prepared for changes, both in our attitudes and in our environment." John Campbell has said that over and over in this magazine, in his editorials and in the kind of stories he published and in his unique way created.

Lundwall goes deeper into the roots of science fiction than some more pretentious books. I have dozens of notes on paragraphs I'd like to quote, ideas I'd like to discuss. I think he underestimates the survival of Victorian ideas and Victorian values well into the formative years of modern science fiction . . . but, then, Sweden has not been a conservative place. He is harsh to Utopian writing–"think what you wish, but think right"–and considers that sadistic mysteries and pornography may be

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the Utopian fiction of our day. He looks on space opera as a branch of "heroic fantasy" of the Conan variety, and on heroic fantasy itself as fundamentally ersatz sex. (As a TV producer, he didn't consider "Star Trek" good enough for Swedish audiences.)

The last chapter of a very thought-provoking book looks into the future of science fiction. He does not criticize the "New Wave" because it is different from the science fiction of the good old days—the science fiction John Campbell made here—but because its theme is "a denunciation of the real world, a return to the abstract, the incomprehensible, the metaphysical," because it is "filled with a general sense of defeat, a wish to turn away from the hard realities of this world." This is, he admits, the direction mainstream literature has taken; the "speculative fantasy" SF writers are merely joining their alleged betters, and in Lundwall's view they are writing themselves into a dead end of "impotent absurdity that says nothing, conveys nothing and means nothing.

He talks about the less advanced but vigorous science-fiction movement that has been springing up elsewhere, better known abroad than to us American provincials. And he gives John Campbell the last word, with some vigorous comments on the "Great Old Authors" whom he found and made—almost a quarter century ago—and who "aren't gonna be told what they should write by that dictatorial, authoritarian, uncooperative Campbell."

"Will somebody tell me why the Great Old Authors will not get off their literary tails and consider something new? They hate me for shoving new concepts and new ideas at them—and damn me for *their* lack of Sense of Wonder!

"The world rolls on and we either roll with it or get left behind to mumble about the Good Old Days. If you think science fiction is getting dull, it just possibly *could* be you . . ."

Read the rest of what John had to say. Read the rest of Lundwall's comments. Then think about them.

ANALOG 8

Edited by John W. Campbell • Doubleday & Co., Garden City, N.Y. • 1971. • 227 pp. • $5.95

The three long stories and six short ones in this collection were in Analog in 1968 and 1969, judging from the copyright credits. There were better stories in those years—hadn't James Schmitz's new cycle of Telzey Amberdon stories started?—but they have gone into other anthologies and collections.

Computers and war are the themes around which the book has been formed, but the best story is Bob Chilson's "In His Image," in which a biologist makes three wholly delightful little androids—female fauns, complete with hooves, horns and twitchily expressive tails—and brings them to Earth to win a place for synthetic beings in the entertain-

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ment world. The human unions get a ruling that the three girls are robots, and a backlash of popular opinion is stirred up by selling one little blonde into "slavery." But it isn't the predictable plot that counts, but the personalities of Sugar, Ginger and Pepper, as winning a lot as we've had since James Schmitz introduced the original witches of Karras.

Colin Kapp's "Gottlos" and Joseph Wesley's "Womb to Tomb" tell almost the same story and make almost the same point in completely different ways. They both deal with the symbiosis between a war machine and its operator, who blend into a *gestalt* that is more potent than the sum of its components. In Kapp's grim—and grimly ironic—novelette the war is somewhere in Europe, somewhere soon, since the enemy war machines have German names. Then the most terrible of them all, *Gottlos*—"Godlost"—begins a strange quest. In Wesley's story of war in space, the descendants of *Gottlos's* operator are not really alive when they are not fighting their machines.

War is also the subject of Dean McLaughlin's "twist" story, "Hawk Among the Sparrows," in which the pilot of a future jet fighter and his ship are caught up in a time-warp and flipped back to France of 1918. Surely the superplane from the future can destroy the Germans and win the war overnight—but the German planes don't have enough metal in them to make a radar image. Their motors aren't hot enough to attract Farman's heat-homing missiles. And all of wartime France has barely enough kerosine to fuel the jet on two short missions.

After the three fauns, the most enjoyable stories in the book are Harry Harrison's unabashed espionage yarn, "The Powers of Observation," and R. C. Fitzpatrick's story of crime prevention in future Pittsburgh, ("Winkin, Blinkin and πR^2.") Harrison's CIA agent in Yugoslavia gets on the trail of a Russian robot which sinks ankle-deep in the hard-packed sand, is a dead shot, and is practically indestructible. Nothing that would daunt a good U.S. agent, of course. Fitzpatrick's story is one of his series about the crew of a de Angelis monitor, the machine that alerts the Pittsburgh police to the build-up of emotional storms that can lead to mayhem, murder or riots. Only a team of bank robbers find a way to go about their business unemotionally, and the cops have to fall back on simple physics.

William Earls's "Jump" and Steve Chapman's "Testing . . . 1, 2, 3, 4 . . ." are also man/machine stories. In "Jump," Spacer Jim Lacey cannot physically endure the gut-wrenching jump from normal space to hyperspace . . . but he cannot live without Space either. In "Testing," Colonel Rafferty is little more than a rubber stamp for the computer that tests personnel . . . until the computer breaks down.

Lawrence Perkins's "The Hidden Ears," I'm sorry to say, is a flying

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saucer gag yarn that would have been at home back in *Thrilling Wonder*. And the Hogbens were fun people.

Incidentally, the book is a beautifully ironic demonstration of the fact that human beings as well as computers are fallible. Part of one of John's fillers is tacked onto the end of "Testing." Evidently it was on the back of the last tear-sheet for the story, and Doubleday's editor couldn't tell that the story had ended and something totally different started. Or is Doubleday using a computer to edit now?

DESTINY DOLL

by Clifford D. Simak • G. P. Putnam's Sons, New York. • 1971. • 189 pp. • $4.95

This is by all odds Simak's strangest book. It may be his candidate for a surfer's spot on the New Wave of speculative fantasy, for it shuttles in and out of inner and outer space with the greatest ease, it dredges symbols out of practically anywhere, and it keeps the reader's Sense of Wonder working overtime. (Let the dust jacket catch your eye, if you like, but then forget it; the dolls you see there have nothing at all to do with the doll of the title—and what its function is, is never really clear—at least, to me).

The book is ostensibly the chronicle of a quest. Spacer Mike Ross, in trouble with the authorities, is hired by a wealthy and eccentric sportswoman to captain an expedition in search of the almost mythical adventurer, Lawrence Knight, and his telepathic robot. She has in her party a scruffy religious nut who seems to be a kind of custodian for a blind man who is to be their direction-finder. Someone or something among the stars "speaks" in his head and summons him across space—clean out of the galaxy, in fact, to the strange planet of a strange sun in a globular cluster in the middle of nowhere.

They land at the edge of a colossal city, and leave their ship barely in time to prevent their being sealed up in it. They are greeted by a herd of hobby horses right out of one of the later Oz books . . . are rousted through a "door" into a desert world where they pick up an alien companion with many and useful powers . . . are tossed back into the empty city and set out with the reluctant hobbies on a quest for the source of blind Smith's "voice." They find incredible miles-high trees—and are attacked by one. They hole up in an ancient temple from which Smith vanishes. They kill the attacking tree, and set loose its hideous tenants. They find the lost robot's missing brain case, and Ross has to fight for it with a troop of centaurs. They find the fabulous Lawrence Knight, embedded in a mirage that makes the one in Merritt's novel seem like a Science Fair illusion.

They . . . but why should you believe me? If you are a Simak fan, you won't believe him either. "The

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Werewolf Principle," "The Goblin Reservation," and "Out of Their Minds"—the last especially—suggested where he was going in his current explorations. Believe me, he's arrived!

OPERATION CHAOS

by Poul Anderson • Doubleday & Co., Garden City, N.Y. • 1971 • 232 pp. • $4.95

If Analog can publish Randall Garrett's excellent series of yarns about a parallel universe in which magic works, then I think I can legitimately report Poul Anderson's book about a similar universe next door to ours.

The similarity ends there. Garrett's interest is historical; Anderson's is technological—which gives me an even better excuse for bringing the book to your attention. The same thoughtful analysis of outré physics that he brought to his story of light-speed phenomena, "Tau Zero"—which is out now as a Lancer paperback: No. 75185, for 95 cents, and which may have won the "Hugo" award as best SF novel of 1970 before you read this—that same careful analysis has gone into the technology of magic.

The book appeared in *Fantasy & Science Fiction* as three novelettes and a two-part serial, over a ten-year span. It now seems that the preliminary episodes are really just curtain raisers for the final adventure which takes the werewolf hero, Steven Matucheck, and his red-headed witch-woman wife, Virginia, literally into Hell to rescue their kidnapped daughter. In the course of the warmup, the two have met in the course of an attack on an *afreet* which Saracen invaders are releasing against the America of their universe and time. They have coped with an escaped salamander which is burning down the town where they are enrolled in college. They have encountered a Mexican succubus during a honeymoon at Acapulco.

I haven't checked back to the originals to see whether Steve's brief glimpses of the Adversary, which suggest a building conflict, were planted in them or have been inserted in the book to tie the earlier stories to "Operation Changeling." In the last half of the book everything comes to a focus, when two-year-old Valeria is kidnapped into Hell and a subhumanoid changeling left in her place. Needless to say, drawing on all the science of their magic and of religion and accompanied by Virginia's fabulous familiar, the tomcat Svartalf—with an obscure but equally fascinating Hungarian mathematician riding shotgun and Lobachevsky going along as a heavenly observer—the wolf and the witch invade the hell universe to take on the Adversary's forces and take back their daughter.

This kind of story would have been featured in *Unknown Worlds* in the good old days. Unfortunately, they are also the gone old days. But if you have any taste at all for magic

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as technology, this book is for you. I only wish Poul had written it straight through, as a unified whole.

SLEEPWALKER'S WORLD

by Gordon Dickson • J. B. Lippincott Co., Philadelphia • 1971 • 203 pp. • $5.95

This isn't one of Gordon Dickson's major science-fiction novels—his probing of *Homo warrior.* It is a little too gimmicky for that—too conventionally science fiction.

Rafe Harald is one of a group of astronauts training on the Moon for a stellar flight that will never come. He goes to Earth to find out why, and is shortly up to his neck in trouble. For the overcrowded planet spends half its time asleep. Whenever the power broadcasts that keep the world's factories churning out food are activated, all but a handful of immunes go into coma. And, it is soon clear, someone is manipulating the effect for reasons of his own.

The road to that someone is a rocky one. It leads first to the fortress where his physicist friend, Ab Leesing, has left his sister in the care of a biologically remade, thinking, talking timber wolf. It leads into the North Woods . . . then to Europe, where a freak who calls himself Shaitan lies in wait. It ends in the throneroom of an immortal, where Rafe and the wolf are killed . . . but that isn't quite the end, after all.

Lucas, the wolf, is probably the only thing you'll remember from the book. Too bad—but there'll be another in the Dorsai saga coming along.

WORLD'S BEST SCIENCE FICTION: 1971

edited by Donald A. Wollheim and Terry Carr • Ace Books, New York • No. 91358 • 349 pp. • 95¢

This is one of the two most reliable annual anthologies of "best" science fiction and fantasy we now have. The other is the "Best SF" series edited by Harry Harrison and Brian Aldiss, which Putnam publishes in hardback—I didn't see last year's—and Berkley reprints in paperback—the 1969 volume is just out and I have it in my pocket for lunchtime reading.

Of the two, this one covers the more conventional sources while Harrison and Aldiss go far afield. Neither can really live up to its title: many of the best short stories and novelettes are promptly snapped up for other anthologies, or held out by the authors for collections of their own. Furthermore, any editor tries to assemble a balanced collection, varied in theme and style. For my money, they succeed very well. (Read their introduction; it will explain their problems.)

"1971" gives you fifteen short stories and novelettes published in American and English magazines, paperbacks (*Quark/1*), and hardbacks ("Orbit 7") in 1970. None of them is outlandishly "new wave," but they are not old-fashioned either. It seems to me that their range

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is—as it should be—representative of the field. Analog, unfortunately, doesn't have anything in the grab bag this year.

Biggest news to faithful readers of this magazine may be that Sturgeon and Asimov are back, and going strong. Theodore Sturgeon's "Slow Sculpture" is a subtle, tormented story whose science is psychology—human relationships—between a man who can repair machines and a woman who can repair minds and grow bonsai. Isaac Asimov's "Waterclap" is an Analog-type story of a future in which mankind is deciding between outer space and inner space—the sea bottom—as its goal.

Other names you'll recognize are Clifford Simak with "The Thing in the Stone," one of his pastorals about a lonely man who makes contact with a universe of "people"—it's a "Hugo" contender—Robert Silverberg with "Ishmael in Love," a really minor tale about a porpoise who falls in love with a human scientist, and Bob Shaw with "Invasion of Privacy," a creepy story about an invasion of Earth by creatures that duplicate the bodies of the newly dead.

Another Hugo contender, and by all odds the strangest story in the book, is R. A. Lafferty's "Continued on Next Rock," in which an immortal man and woman apparently carry their endless wooing through time. The Lafferty flavor is inimitable. Zaniest may be Larry Niven's "Bird in the Hand," in which time travel is used to pluck souvenirs out of the past and a moronic bureaucrat wants a roc. Ron Goulart's "Confessions," a story of future crime in an arratic and erotic era, is almost as much fun.

There are seven more stories by newer writers. Gregory Benford's "Nobody Lives on Burton Street" extrapolates some present theories about violence as a "good thing" that allows rioters and vandals to work off their aggressions in a "healthy" way. "Whatever Became of the McGowans," by Michael Coney shows us how a strange planet can protect itself. "The Last Time Around," one of Arthur Sellings' last stories, is a story about the generation gap as it applies to spacemen who are gone from Earth for generations. This is going to be on future "best" lists, too.

Neal Barrett, Jr., in "Greyspun's Gift," introduces a space-wanderer into a peculiar family who try to tell him what human beings "do." "The Shaker Revival," by Gerald Jonas, may be the most unusual science-fiction story of the year—one that blends today's youth movement and the Nineteenth Century utopian cult, the Shakers, into something new and strange. Gordon Eklund's "Dear Aunt Annie" takes us to the world of robot lovelorn columnists and less pleasant things, and H. B. Hickey's "Gone Are the Lupo" treats the theme of "The McGowans" in quite another way.

You can't afford to pass up this anthology any time, even when I do.

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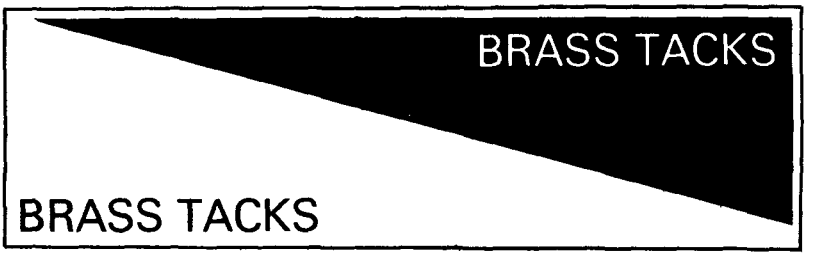

Dear John:

As one who's been trying for the last few years to build up Ceylon tourism—despite recent discouragement from insurgents—I take an extremely dim view of your July editorial. Just how big do you think the country is? You've killed off half the population in two years!! My friends often say I'm not very observant, but I'm sure I'd have noticed *that . . .*

In 1966, when you say the malaria death toll was 2.8 million, the total number of deaths *from all causes* was actually about 95,000. (The population then was 11.4 million and the death rate 8.3 per thousand.) I don't have the later figures, but they're in the same ball park.

I can only assume that you've got hold of the sickness figures, though I find it hard to believe that they are that high. More likely the number of man-days lost. New York would sound a mighty unhealthy place if all the 'flu cases were put down as deaths.

Nevertheless, there's some validity in your argument. Ceylon is the classic, textbook case of malaria control by DDT—in the late 40's—followed by population explosion and its attendant problems. And a slackening of the spraying campaign *did* result in an upsurge in disease for a time.

ARTHUR C. CLARKE

My source—a respected British Journal—seems to have misled me. They evidently reported "deaths" where they should have said "cases."

Dear John:

Foosh on Frank Kelly Freas! He is a beautiful artist and one of the

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best science-fiction illustrators extant. But . . .

On the July 1971 cover, he used the wrong paint color pattern on the Saturn-V launch vehicle!

How come Frank missed on the Saturn and got the more difficult mallard duck color pattern correct?

The color pattern shown on the cover Saturn-V never flew. It was the pattern that was on the AS-500F facilities check-out vehicle, a dummy that was used to test compatability between vehicle and ground equipment.

The color pattern for every Saturn-V that flew is shown on the cover of your January 1970 issue.

Look out! We bird-watchers know!

G. HARRY STINE

Dear Harry:

The error you refer to is an example of the triumph of inherent stupidity over the most dedicated instruction.

Everyone—at Cape Kennedy and elsewhere—gave me all the help I could have dreamed of: I was deluged with information both verbal and pictorial; I was shown equipment and techniques I could *never* have dreamed of. I was surely in the science-fiction artist's seventh heaven.

Unfortunately, on the way home, I quite literally fell on my face, knocking out all my front teeth, among other things. The ensuing round of pain killers, tranquilizers and so on, evidently left my subconscious minding the store.

Obviously, I have an unusually stupid subconscious!

KELLY FREAS

Dear Mr. Campbell:

Just read your editorial "The Baby in the Bathwater." I almost hate to say it, but you're right. It seems war is just about the only activity that has consistently stimulated Man's inventiveness right throughout history. I wish it wasn't so, but it is.

You stirred out of my mind's Useless Information File the memory of a case that classically supports your thesis. Here it is, for whatever it's worth:

Up to the time of Napoleon Bonaparte, armies on the march more or less relied for food on what they would beg, buy or steal from the local countryside. But Napoleon's campaigns became so vast that this method ceased to work, thus threatening Boney's imperial dreams. ("An army marches on its stomach," he is supposed to have said.)

As a result, the French Directorate offered a substantial prize to anyone who could invent a practical and reliable method of preserving food in quantity. The award was claimed by one Nicholas Appert, with a revolutionary idea of sealing food in jars topped with wax. Appert didn't know why it worked—it took Louis Pasteur to find that out—but it worked just fine.

By the middle of the century, the

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same principle had been applied in preserving food in metal cans, both in Europe and America . . . using handmade cans!

It took another military thing to get the idea going properly, and it was the American Civil War that created the demand that produced mechanized, high-volume can production and canning processes.

The modern concepts of food packaging can mostly be traced back to the mechanized metal can and the commercial possibilities it opened up.

I like to speculate how much different the world might be today if Appert had not come up with his idea. Maybe Napoleon would have been defeated sooner; maybe the Civil War would have been different. Without canned foods, the monstrous battles of World War I would have been impossible. And so on. I doubt whether the modern city could even exist without the sophisticated food packaging we know today.

And look who started it all—Boney himself, the arch-warmonger.

All this rather appeals to me in a bitter sort of way, as an abstract philosophical problem.

Incidentally, to support your point that technology does not necessarily need science—Appert had the techniques all figured by 1809. Pasteur was not born until 1822.

TONY STEEMSON
9 Domett Ave.
Auckland, New Zealand

The military are normally under desperation, life-or-death pressure. That does make them willing to try new, desperate measures, like original ideas!

Dear Mr. Campbell:

I am very interested in getting some information regarding what is known as the "Smith Coil"—sometimes, as just "The Coil." I thought perhaps some of your readers might know of this coil and help me. The coil was "invented," or developed, by Wilbert B. Smith, a Canadian electronics engineer with the Canadian Government. The coil was experimented with between 1952 and 1962. Smith is now dead.

The coil is said to be a single winding or insulated copper wire, about #16 or #18 gauge, wound on a "ferrite" core 1" to 1½" diameter, and about 9" long. The coil is "caduceus wound"—that is, one begins the winding in the *middle* of the wire's length, winding the two wires in *opposite* directions around the core and crossing these wires on the *same* opposite diameter points each time around.

This coil is said to be an "energy sink"—that is, current fed into it just disappears, causing no radiation, even of heat. When operating and placed near a grid dip meter, the coil is said to show a large number of resonance points across a spectrum of from 200 to 2.0 Mc. This coil is further said to have zero impedance. Further, two or more coils can not be coupled together.

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Ferrite is commercially represented by the chemical formula, XFe_2O_4—the "X" representing any of several other metals—nickel, cadmium, copper, gold, et cetera. Which of the ferrites is right for this coil is not known to me.

Any information will be greatly appreciated.

GASTON BURRIDGE
500 Crofford Street
Sevierville, Tennessee 37862

Any reader have any information? Any gadget that can take energy in and make it vanish sounds extremely interesting! Where does it go?

Dear Mr. Campbell:

I have a few comments on your editorial in the June 1971 issue of Analog. Agreed that it is almost as cheap to send manned missions to the Moon as unmanned probes and that a man can do much, much more than any remotely controlled system, beyond that point you depart from a realistic examination of the problem.

Any man participating at the growing edge of a technology must be a highly intelligent and trainable individual if he is even to survive. Certainly the astronauts, as professional test pilots, qualify in this respect and would be highly amenable to a quick training course in any technical area such as geology. It must be considered though, that at this stage their first duty is getting back alive, preferably after accomplishing their mission. They need not be highly expert, anything they do or bring back must be extraordinarily significant due to, if nothing else, its newness. They need not be that competent in anything but staying alive. This condition will pertain until the first flush of exploration ends. At that point it will then become clear that specialization and expertise are still necessary.

No sane man will throw away the fruits of his life's work to go off on a toot. This includes professional scientists. This also pertains for the astronauts. It will be noted that their training program very carefully maintains the qualifications they brought with them as professional engineering test pilots. Other training they receive is ancillary, a necessary concomitant of the job and, if the truth be admitted, superficial. It is unreasonable to expect you can take a man who is on the verge of, or who perhaps just has, made a mark in his chosen career and sequester him for several years. If the astronaut training program had been based on this premise from the start it already would have been a phenomenal failure. There are few sufficiently altruistic to completely redirect their lives especially in a program which might shortly be terminated, leaving them high and dry, their past qualifications rusty, their future qualifications undeveloped. It might even be fair to hypothesize that the necessary altruism is inversely proportional to the individual's qualifications.

Until the day that space travel is

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advanced enough to permit passengers and/or piloting the craft comes into the same category as piloting a private plane, the scientific achievements of space exploration must remain superficial. A trained scientist is to an astronaut as an astronaut is to Lunokhod. We will have to struggle along on the present basis for quite a while, if our space exploration program survives. I am afraid that our belief in it and the utter necessity of it will be insufficient to save it. The problems of our society and the pressures they engender will leave us as voices crying in a wilderness.

I am involved in a program of development of narcotic antagonists and, of necessity, in the question of what constitutes addiction and dependency. I found the story titled "The Swan Song of Dame Horse" quite interesting but with holes the proverbial truck could get through. Primarily, there is no centrally acting analgesic that does not have an easily demonstrable structural analogy to morphine. It may not be readily apparent in a two-dimensional diagram on paper but a short session with a set of molecular models will demonstrate the fact. If such an agent as PV existed and were used, the only pain killers left would be peripherally active agents such as aspirin, acetaminophen, phenylbutazone, indomethacin, et cetera. There are no synthetic agents or artificial substitutes for morphine which do not have an active core exactly equivalent to that of morphine. Even the narcotic anatagonists such as nalorphine, pentazocine and cyclazocine, which have analgesic activity also have addiction liability. The only absolutely non-addicting anagonist, naloxone, has absolutely no analgesic activity. Lay off the PV until I give you a go-ahead.

I have always found your editorials interesting even if irritating. You have the most sublime ability to redefine terminology and quickly slide back into the commonly assigned context. The crux is, of course, that if your redefinition were accepted and adhered to, the point of view you espouse would disappear. Keep it up, I find most of your editorials good for my logical faculties. I keep them in shape by trying to find the twist as rapidly as possible. I have been reading Astounding/Analog since you ran part 2 of "Children of the Lens." I cannot even remember what year that was. You have played a part in making me what I am today.

MORRIS PFEFFER
5 Willowbrook Avenue
Bay Shore, New York 11706

1. Evidently they'd developed non-opiate analgesics at the time of the story.

2. PV was distributed only in illegal opiates—noncriminal patients would not have been affected. Tough on criminals maybe, but . . .

3. My editorials are intended to challenge "everybody knows" postulates—not particularly to sell mine!

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EDITORIAL
continued from page 7

feeding into the big telescope. By mixing the light from the two light-paths, he caused the arriving light wave fronts to undergo interference, with cancellation and reinforcement. This could be measured, and calculations then permitted him to determine the diameter of the light-source from which the wave fronts came. The Michelson Interferometer gave us our first real *measurement* of the diameter—angular diameter; not linear, of course!—of stars other than the Sun. It worked fine on red giants such as Betelgeuse and Antares.

About a dozen years ago, radio astronomers started improving their angular accuracy by using the interferometer principle in their work. Two or more radio dishes set up some distance apart—anywhere from 1,000 feet to several miles—and connected together with very carefully designed "phase flat lines" that accurately preserved the phase relationships of incoming wave fronts, could do approximately what Michelson's interferometer had done at Mount Wilson.

Except that, again, the scale factor intruded. There's a huge number of light wavelengths in thirty feet—but nowhere near as many radio wavelengths in even thirty miles. What was needed was a pair of radio telescopes interlinked with phase-flat lines, and separated by something more like 3,000 miles.

This causes a certain amount of trouble; to carry a signal 3,000 miles across country involves multiple amplifier-relay stations, each of which necessarily introduces slight, and not really knowable, phase delays. The time-of-transit tends to vary, moreover, due to temperature changes along the 3,000 miles of line. Radio microwave links have a nasty habit of being bent into unexpected curves—adding length, and, therefore, delay—as the weather and the sun's effects change.

Theoretically that would have been fine. In practice, the answer is "Forget it! You'll never know what's going on in that link *now*, however much you may know what was happening the last time you checked it."

A workable, practical answer was finally achieved when research on time standards reached the necessary level of accuracy. It is now possible to build a "portable" clock of such accuracy that they can make tape recordings of the incoming wave fronts on two radio telescopes anywhere in the world, and by timing *exactly* when the wave peaks came in, cross-compare the two distant stations for the peaks and valleys that give the required data. All that's needed is a clock that can be trusted to the nearest billionth of a second over a period of a few weeks, and can be moved from one observatory to another.

The development of the Caesium

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Ion clock made that possible.

Now one of the applications of the new, extremely high level of precision in radio astronomy was applied to studying how the Sun's mass "bent" light. Observations on gravitational bending of light rays is possible only during total eclipses; the opportunities are few, brief, and almost invariably very badly located. A total eclipse in Ireland, Scotland, or Scandanavia during the winter months isn't worth bothering with; you can almost certainly guarantee it'll be cloudy and drizzling. With bad luck you could add a snowstorm in Scandanavia.

But radio telescopes aren't bothered in the slightest by sunlight; they can tune it out, and the atmosphere, which scatters light vigorously, doesn't bother radio appreciably.

So radio astronomers picked a quasar that was due to be occulted by the Sun, arranged to use Caesium Ion clock timing, and two radio observatories some 2,500 miles apart.

They were quickly diverted from their study of light bending near the Sun's mass; their quasar turned out to be quasars—it was a sort of binary quasar, with the two parts evidently separating. They were able to measure radio-frequency source angles, using the interferometer system, to greater accuracy than the optical telescopes could, and so separated the A and B parts.

Further studies caused even more confusion.

The two parts were separating with a velocity that figured out as *ten times the speed of light.*

There has been a sudden revival of interest in new and markedly different theories of the nature of quasars. There have been a number of exceedingly odd characteristics that quasars appeared to possess, such as being the most remote objects ever discovered—that twin-quasar with ten times light speed mutual retreat, for instance appeared to be three billion light-years distant. Quasars also appeared to be releasing energy at a superfantastic rate, a rate so great that the total annihilation of mass—the $E=mc^2$ energy—of millions of solar masses would be required to account for it. If, that is, one could figure out some process whereby a 100% annihilation could take place. The matter-anti-matter reaction doesn't completely annihilate matter; electrons and positrons do annihilate, but protons and antiprotons do not. An assortment of particles, and a portion of the mass, remain.

Then there was the matter of a quasar having a measurable area in the photographs; an object three billion light-years distant, in order to have a measurable area on photographs here on Earth, has to be an *extensive* object. Nothing so minute as a mere red supergiant star, with a diameter measured in a few billion miles, could possibly be detectable save as a dimensionless point at this distance. It had to be something at least the size of a galaxy, thousands of light-years across.

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Now that would have been all right—except that the quasars frequently showed variations in output; they flickered in a matter of a few days or weeks. How do you get a majority of the stars in a galaxy a few thousand light-years across to turn on and off in faultless rhythm? No signal can travel faster than light, so you can't have a synchronizing pulse any faster.

Quasars have been obnoxiously recalcitrant objects since their first discovery; the new finding of two of the beasts separating with a mutual velocity of ten lights is getting to be a bit too much. *Something* is wrong with the concepts of the fundamental nature of the things.

To me, the most suspicious factor about their presently assigned parameters is their distance. That binary quasar is assumed to be 3,000,000,000 light-years distant; using that assumption, then if the two are moving apart with an angular velocity X, their linear velocity of separation from each other must be 10*c*. which reads "Impossible!"

Change our assumption of distance to 3,000,000 light-years instead of 3,000,000,000 and a number of remarkable results fall out. At only 1/1000 the distance, the same angular distance measure yields a linear velocity only 1/1000th as great—1/100th light-speed instead of 10*c*. We can label that one "Possible."

Next, that super-fantastic energy output, annihilating millions of Sun's worth of matter every year: Well, that's derived from measuring the amount of radiant energy reaching the Earth, and applying the inverse square law to compute how much energy had to start to yield the measured flux at the enormous distance of 3,000,000,000 light-years.

Since this time we're working with an inverse square law, cutting the distance cuts the energy output computed by a factor of 1,000,000. A few Sun's worth of mass is about what gets converted to radiation each year in an ordinary galaxy—when you add up the output of a few hundred billion stars.

There remain two things that require explanation: the flicker effect that makes a quasar variable, and the redshift that originally led to the assumption the objects were billions rather than millions of light-years away.

Those I think can be explained.

The redshift—as most science-fiction readers know—refers to the observed fact that the spectrum lines received from the stars of distant galaxies are uniformly shifted toward the red. The only phenomenon known that could explain that redshift when it was first discovered was the effect of a velocity of retreat. All the galaxies—save for a very few, very close ones—were moving away from us.

As techniques were developed for judging the distance of galaxies—by observing individual stars of known types having known luminosities,

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thus finding the distance of the galaxy containing the star, and similar techniques—it became possible to compare the distance of a galaxy and its redshift. It turned out that as the distance increased, so did the amount of the shift toward the red.

Then it became possible to use the redshift as a means of estimating the distance of a galaxy at a distance so great none of the more direct techniques could be used. (No individual stars could be resolved because of the immense distance of the galaxy.)

When the quasars were discovered, the same formula was applied to them; since their light was very extremely reddened, they must be retreating at immense velocity, really approaching the velocity of light itself, and must, therefore, be not millions, but billions of light-years distant. And the paradoxes of super-*c* speed, super-fantastic energy release, and the others all stem from that.

However, since Hubble's original work on galactic distances and speed and redshift, Einstein's studies have shown another phenomenon can cause redshift; a powerful gravitic field.

Light struggling out against an attracting gravitational field remains subject to the fundamental laws; because it is energy, it is mass, and *any* mass is attracted by a gravitational field. The Sun, for instance, releases some 4,000,000 tons of radiant energy per second. The surface gravity of the Sun is about 28 times Earth's. The escaping 4,000,000 tons of radiation has to lift outward against that 28-G pull; the intensity falls off as the square of the distance increases, but it takes an enormous amount of energy to lift 4,000,000 tons of mass out into space against the pull of the Sun's gravity. The light inescapably has to pay a toll of energy in making its escape.

The reddening produced by the Sun's gravity is so slight as to be at the very limit of our ability to measure. But remember that the "black hole" stars, the *collapsars, are* black because light hasn't energy enough to pull away from their appalling gravitational field.

Almost any imaginable redshift between the immeasurably small Solar redshift, and the total extinction "redshift" of a collapsar is possible by gravitational effect, then.

It has been shown that a whole galaxy, if it approaches the density of some of the known dense star clusters, can become a black galaxy, having light trapped by its gravitational field just as the light of a collapsar is trapped by its deep gravity well.

Then—what about a galaxy that's halfway to being a fully "black" galaxy? One in which the density has risen to such a degree that light would lose half its energy climbing out the thousands of light-years to get into intergalactic space? Clearly, the light would be heavily redshifted.

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Now if you assume that *all* galactic redshifts are *always* due to velocity of retreat and distance, such a galaxy would seem to be immensely distant, even if it were, in fact, only a few million light-years distant.

So let's change the assumption; we'll say that quasars are extremely dense, relatively nearby galaxies having immense gravitational fields. These fields cause extreme reddening of light leaving the galaxy—though not making any great change in conditions within the galaxy itself.

The galaxy, as it condenses toward higher density, naturally shrinks; even though not much further than the immense Andromeda galaxy, it would be far smaller in diameter, looking more like a fuzzy star than the galaxy it actually was.

The energy output would be somewhat less than expectable from a normal galaxy of its total star-count, because so much of the energy is being trapped—so much is being bent back into the galaxy by gravity lens effects.

Such a galaxy might well "twinkle" as seen from Earth because of a new kind of turbulence. The dense gravity fields out toward the surface of such a high-density galaxy would *not* be homogeneous, nor would they be static. The stars that are producing those fields have to *move* to resist the complete collapse of the galaxy; they'd be circling the center of gravity with speeds of thousands of miles a second, in complex orbits in three dimensions. The result would be a gravitational "surface" full of lumps, hollows, bumps, valleys and unexpected smooth areas. Draw a line from the center of the galaxy to any distant point—such as Earth—and the boiling, changing, rolling gravitational surface would—if you could see it!—look very much like an ocean with stupendous rollers, and a violent cross-chop, all in slow motion and enormous scale. Any beam of light coming out through those fields—remember that gravity fields can act like lenses—will be deflected, twisted and mauled.

From a distance, the galaxy will appear to twinkle, on a scale of a few weeks or days. It isn't the galaxy that's misbehaving—it's the medium (gravity) we're seeing it through.

On this basis, all of the major paradoxes of the quasars seem to make sense.

It also suggests that maybe those storied intergalactic trips won't be so placidly boring as has been suggested; from what we know now intergalactic space may have quite a supply of black galaxy traps—traps which would be invisible and indetectable except by their gravitational fields. Run into one of those very far before realizing it, and . . . well, maybe one of the authors can do a story about that, titled "A Galaxy Called Rome."

You know—things can go *into* a black hole, but nothing ever comes out. All roads lead to it only.

THE EDITOR.

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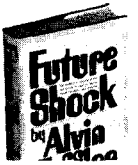

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